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DEVELOPMENT OF A TEC MANAGER'S GUIDEBOOK

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Submitted by

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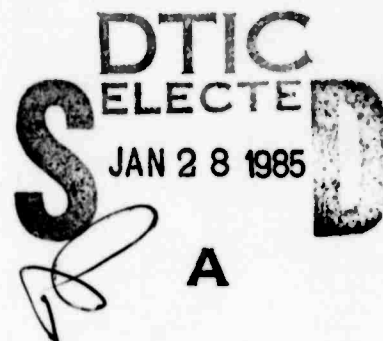TRAINING RESEARCH LABORATORY

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This Guidebook is a job performance aid for Training Extension Course (TEC) managers and developers. As a source reference it provides information on the organization, management, and supervision of a TEC program, and the preparation, development, validation, and dissemination of TEC lessons. For other personnel involved with TEC, the Guidebook serves as a comprehensive overview of the TEC development process.

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FOREWORD

This report is one of a series on the research support provided by the Mellonics Systems Development Division of Litton Systems, Inc., to the Army Research Institute for the Behavioral and Social Sciences (ARI) under Contract Number DAHC 19-77-C-0011. This report is part of the final report of the total contractual effort and is incorporated into that report by reference.

As set forth in the Contract Statement of Work, the Mellonics effort includes support to the Training Extension Course (TEC) studies presently being conducted by the ARI. One of these studies involves the development of a TEC manager's guide. This guide provides general guidelines for TEC managers and lesson developers, and should be a useful reference source during TEC lesson development. It also serves as a training aid for new managers and developers.

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ABSTRACT

This Guidebook is a job performance aid for Training Extension Course (TEC) managers and developers. As a source reference it provides information on the organization, management, and supervision of a TEC program, and the preparation, development, validation, and dissemination of TEC lessons. For other personnel involved with TEC, the Guidebook serves as a comprehensive overview of the TEC development process.

TRAINING EXTENSION COURSE

COURSE

MANAGER'S GUIDEBOOK

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Development & Evaluation Associates, Inc.

ACKNOWLEDGMENTS

TABLE OF CONTENTS

PREFACE

PURPOSE

The Training Extension Course (TEC) Manager has two areas of responsibility. The first comprises organizing, managing, and supervising a TEC program. The exact nature of these functions will vary from school to school because of different school organization and different types of internal constraints. The second area is more consistant across schools. These functions cover the preparation, development, validation, and dissemination of TEC lessons. In addition, there existed no single, easily accessible source of information to assist TEC managers and lesson developers in the development of TEC lessons. Thus, the purpose of this Guidebook is to provide in one document, general guidelines for TEC managers and lesson developers to be used as a source reference during the TEC lesson development process and to serve as a training aid for new managers and developers. The Guidebook can also serve as a reference for TEC project officers at the Army Training Support Center, Training Programs Directorate (ATSC-TPD), as well as, other personnel who are involved with TEC. (e.g., some sections of the Guidebook may be useful to contractors for defining criteria and developmental procedures).

SCOPE

The Guidebook is designed to be used as both an information document for monitoring contractor lesson development efforts and a procedural guide for designing and developing TEC lessons in house, i.e., within the existing resources of the school. The Guidebook provides an introduction to managers and lesson developers for the tasks and procedures that have to be considered when a TEC lesson is under development. It will not eliminate the need for other resources, such as, changes to contract statements of work (SOW). It is not a fully proceduralized job performance aid and does not list step-by-step procedures for all decision alternatives. Rather, it introduces the TEC program and general TEC management techniques. It also gives examples and guidelines for developing and evaluating TEC lesson criteria.

CONTENTS

The Guidebook is divided into six chapters, followed by a glossary and an acronym list.

Chapter 1 provides introductory material on TEC organization; relationships between the schools, the ATSC-TPD, the Project Manager for Training Devices (PM TRADE), and the Naval Training Equipment Center (NTEC); and responsibilities and training opportunities for TEC managers.

Chapter 2 presents material related to systematic approaches to course development; relationships between TEC, the Instructional Systems Development

(ISD) model, and Directorates of Training Development (DTD); planning requirements and techniques; use of Subject Matter Experts (SME); and recurring report requirements.

Chapter 3 discusses the requirements for preparation for TEC lesson development. This includes an overview of the basic principles, preparation techniques and procedures for TEC lesson development, how to select media, how to write the Coordination and Contract Summary Sheet (CCSS), and how to write Lesson Administrative Instructions (LAI) and Student Instruction Sheets (SIS).

Chapter 4 provides human factors criteria and design information to assist in designing and monitoring the development of TEC lessons. Criteria are discussed for application to both development and evaluation of TEC lessons. All TEC lesson types (audiovisual, audio only, printed text, and job performance aid) are discussed.

Chapter 5 presents a detailed discussion of the TEC manager's job in conducting or monitoring the TEC evaluation process. It includes discussion of how to validate pre- and posttests and how to conduct the sequence (cycle) of tests necessary to demonstrate TEC lesson training effectiveness.

Chapter 6 discusses the requirements on the TEC manager for preparing the final TEC materials for distribution and for historical storage of the data and materials. It also describes the shipment of TEC lessons to the Training Materiel Support Detachment at Tobyhanna, TEC lesson annual review procedures, procedures for a safety violation, and safeguarding of defense information.

HOW TO USE THIS GUIDEBOOK

This Guidebook is designed for a "thumbing through" approach. Descriptive illustrations, flow charts, high-lighted material, and subject headings are placed at the outer portions of each page to permit easy location when thumbing through the book, from either direction. "White space" is contained in the outer columns of each page for each user to write his or her own personal notes. The loose-leaf format allows information to be added as TEC policies and requirements change, and permits each user to tailor the Guidebook to their school's organization.

CHAPTER 1

ORGANIZATION AND MANAGEMENT
OF A TEC DEVELOPMENT UNIT

CONTENTS

CONTENTS (continued)

1-2

This chapter serves as an introduction to the Training Extension Courses (TEC). It provides you with information on TEC organization and management. Relationships between the Service Schools, the Army Training Support Center - Training Programs Directorate (ATSC/TPD), the Project Manager for Training Devices (PM TRADE), and the Naval Training Equipment Center (NTEC) are discussed. Included also, are the responsibilities of and training opportunities for TEC managers.

ORGANIZATION AND MANAGEMENT
OF A TEC DEVELOPMENT UNIT

- TEC HISTORY AND
  PHILOSOPHY

- ORGANIZATION OF TEC

- SCHOOLS, ATSC/TPD, PM
  TRADE, NTEC, AND CONTRAC-
  TOR RELATIONSHIPS

- TEC MANAGERS' RESPONSI-
  BILITIES AND TRAINING
  OPPORTUNITIES

1.1   INTRODUCTION TO TEC HISTORY,
      PHILOSOPHY, AND ACCOMPLISHMENTS

In order to help you understand the background and purpose of TEC, this section includes information about the history of TEC, its philosophy, and its relationship to other Army training programs.

TEC DEPENDS ON YOU

EFFECTIVE MANAGEMENT

EFFECTIVE PROGRAM

TEC IS

- SOLDIER TESTED
- SURE TO TEACH
- RESULTS ARE GUARANTEED

GUARANTEE

1-4

The success of the Training Extension Course (TEC) depends on you. An old cliche? Maybe, but nevertheless true. The success of TEC depends upon more than just having a TEC manager at each school to supervise the legal fulfillment of the contractual requirements. The TEC program is relatively new, and even though its success is steadily mounting, there are many service schools and field commanders who are not taking full advantage of TEC. Thus, the program still needs to be sold. The best way to promote TEC is to have motivated TEC managers who know the training philosophy, the development process, and the management aspects of TEC; who believe in it; and who capitalize on every opportunity to sell TEC to units and to resident instructors. This guidebook is aimed primarily at the first of these three characteristics: to help you know TEC. This resource is provided to help you understand the purpose, background, and philosophy of TEC, and the procedures for managing TEC, but that is as far as we can go with a book.
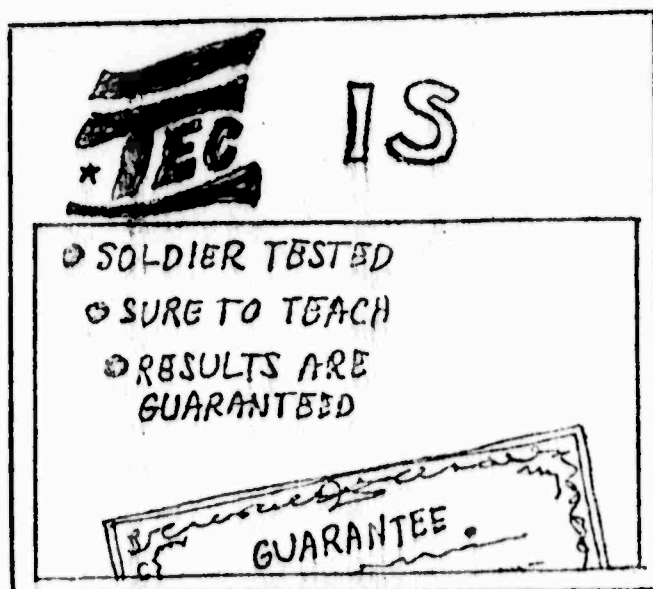
We have found that the second characteristic, the belief in TEC, comes from experience with TEC. The program speaks for itself. After trainers, commanders, and trainees are exposed to it and try it, they are impressed. This fact supports the importance of the third characteristic of the dedicated TEC manager. By recognizing opportunities to expose people to TEC and showing them how to organize so it will support their training, you will be providing the program with the opportunity to "sell itself".

Accordingly, this section of the guidebook is aimed at helping you sell TEC. It provides you with background knowledge on the history, philosophy, purpose, and effectiveness of TEC. Hopefully, it will be motivating, informative, and useful in helping you become an effective representative of TEC. Subsequent sections and chapters will present recommendations and techniques to help you become more proficient in the procedures required to manage TEC.

TEC WORKS

SOLDIERS WHO TRY IT BUY IT

1.1.2 What is TEC?

TEC is a program that has been designed to help put into the hands of trainers, both in units and in institutions, exportable, performance-oriented training packages. It is designed to provide soldiers and their commanders with immediate access to high quality, self-paced, multimedia instruction especially designed to assist in acquiring and maintaining skills critical to the soldier's on-the-job performance. Each TEC lesson is individually packaged, and ready for use on an individual basis, or by small groups, under the supervision of an NCO.

1.1.3 Reasons for TEC

Historically, TEC began in the early 1970's as a response to a number of problems in individual training. The most serious of these was detected by the U. S. Army Board For Dynamic Training. They found that many soldiers in combat arms units were not able to perform critical tasks in their primary Military Occupational Specialty (MOS). This lack of competency on the part of individuals can quickly mushroom and destroy a unit's combat capability. In the process of considering solutions to this problem, many other problems were uncovered that confront commanders, training managers, and trainers. Some of these problems were:
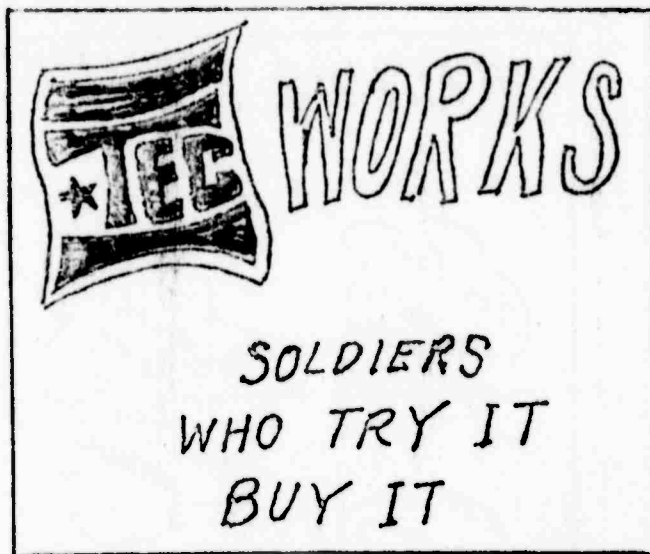
TRAINING PROBLEMS?

Too few trainers, too little time

Too much turnover, too few personnel

Too many changes in doctrine

Too little money, too little space

R̄x → TEC

TEC FEATURES

- SELF-PACING

- LESSON ADMINISTRATIVE INSTRUCTIONS

- DIAGNOSTIC TEST (PRETEST)

- VALIDATED CONTENT

- INDIVIDUAL OR GROUP INSTRUCTION

- MULTIMEDIA DELIVERY

- Insufficient numbers of qualified NCOs to conduct the required training.

- Demands on the commander's time which interferred with training time.

- Personnel turbulence such as frequent turnover and low manning levels.

- Rapidly changing doctrine which necessitates changes in training.

- Limited training resources such as the shortage of time, personnel, and space to provide sufficient field-based training.

All of these problems underscored the need for a system of exportable training support that would make performance based, high quality instruction available to field units in an easy to use format. TEC was conceived as such a system.

1.1.4 Characteristics of TEC

TEC training materials are designed to emphasize performance -- what the soldier will do as a result of the training. The training is developed and validated to insure that the soldier will, in fact, be able to perform the task after the completion of training. TEC lessons have incorporated the following features:

- Self-pacing: A soldier can work through a lesson individually at his own pace. He can repeat the lesson as often as necessary until he achieves mastery.

1-6

- Lesson Administrative Instructions (LAI) are provided with each lesson. They provide guidance for the trainer on how to use the training system to Identify and solve individual training deficiencies.

- Diagnostic test (pretest): This test can be used with individuals to determine whether they need to study a given lesson, and it can be administered by a commander to his soldiers to assess their job proficiency. It is the first step in the management of training.

- Validated content: During the development phase, each TEC lesson is tested on soldiers in units to verify that it will teach.

- Individual or group instruction: Many of the lessons can be used by as many as ten soldiers at once, and all of the lessons can be used individually.

- Multimedia delivery: TEC lessons are currently produced in a variety of modes (audio-visual, audio only, printed text, and job performance aids) depending upon which is most appropriate for the objectives of a given lesson.

1.1.5 Philosophies of TEC

TEC is most effective when the people using TEC understand certain philosophical and scientific assumptions that form the background of this program. Educational psychologists have proven that better learning usually occurs when the learner makes frequent, active responses, few errors, and receives feedback on his performance. Furthermore, retention

> LEARNING OCCURS WHEN THE LEARNER MAKES
>
> - FREQUENT, ACTIVE RESPONSES
> - FEW ERRORS
> - RECEIVES FEEDBACK

and transfer of learning are
better if the training situation
closely simulates the actual
performance situation, and the
learner has opportunities to
practice what he has learned.
These principles are operating in
the following statements that
characterize the philosophy of
TEC:

- Learning is a self-activ-
  ity. Numerous studies have
  demonstrated that students
  learn faster, retain longer
  and have a higher motivation
  when they control their rate
  of progress toward training
  goals.

- Training should overcome
  a performance deficiency.
  Since the achievement of
  specific performance objec-
  tives is what we are after,
  no training need be undertaken
  if the soldier can already
  all the performance objectives
  in a satisfactory manner.

- Training is best if it
  closely approximates the real
  world condition. When the
  soldier can relate the tasks
  to his real world job require-
  ments, he will be more motiva-
  ted and will learn better.

- Soldiers learn and retain
  more if they participate
  in the training rather than
  merely being exposed. Lesson
  materials providing "hands on"
  training are the most effective.

- Soldiers would rather learn
  than not learn. Most soldiers
  strive for competency and
  professionalism in their chosen
  career. The key is to devise
  a management system to make
  the training materials avai
  able and job relevant.

1.1.6 Relationship Between TEC and Total Army Training.

TEC and Total Training.

The current concept of Army training is based on the belief that training should be:

- Exportable so that it is available where it is needed.

- Performance based so that soldiers are learning skills rather than just knowledge.

- Validated so the training can be proven effective.

Does this summary sound complete to you? In fact, there is one vital element that was left out. It is the question of whether the training is worthwhile. For every lesson, course, and training guide-book we must ask, "is it worthwhile?" The answer to this question is found by answering a companion question which is, "Is this a vital, necessary skill in a given soldier's job?" Every school in the Army has been required to answer this question for their proponent military occu-pational specialties (MOS). They have conducted task analyses in order to identify the critical tasks in each MOS. This task list, combined with the training philosophy form the foundation for the Army's training program. TEC, along with the other current training support activities, is built upon this foun-dation.
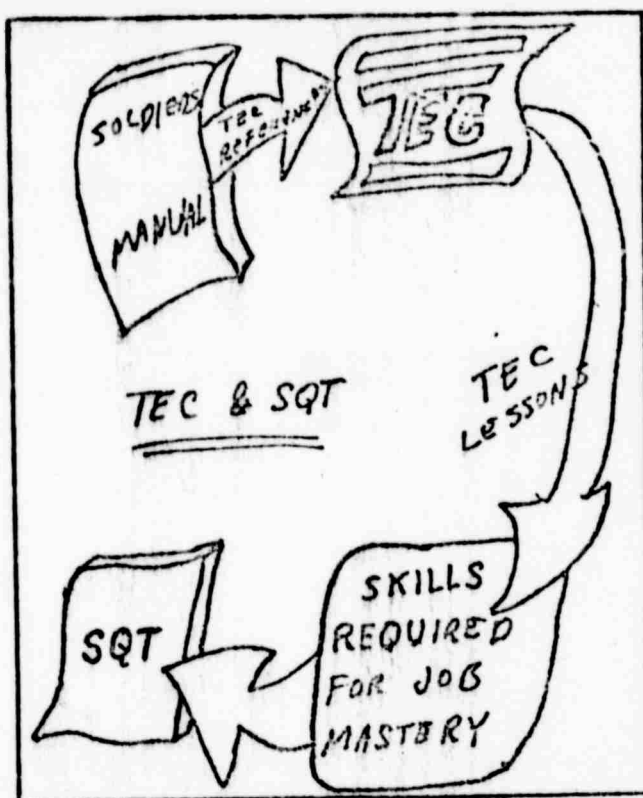
TEC, EPMS, and SQT. TEC is a vital training component in individual training under the Enlisted Personnel Management System (EPMS). This system brings together, for the first time, job requirements and training requirements for each grade in each MOS. These requirements are identified in the Soldier's Manual, and proficiency is measured by a Skill Qualification Test (SQT). TEC is designed to provide training on critical tasks that are defined in the Soldier's Manual and might be included in the SQT.

The soldier can identify those tasks for which he needs to achieve proficiency by reviewing the Soldier's Manual and taking the appropriate pretests. He can then use the available TEC lessons independently, or in conjunction with on-the-job training (OJT), to develop the necessary skills. As a TEC manager, it is imperative that you help insure that TEC interlock with the overall training development effort and that trainers in units and in the schools understand this relationship.
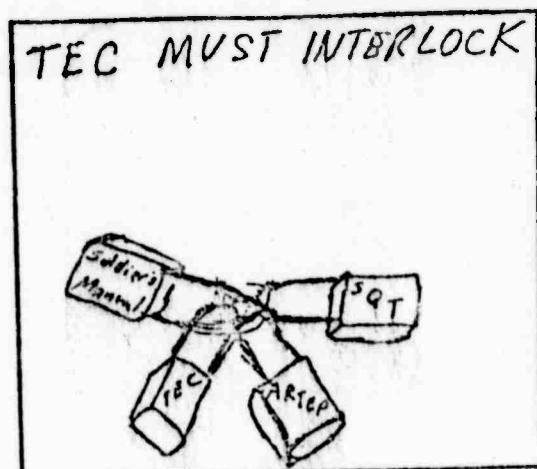
TEC and ARTEP. The Army Training and Evaluation Program (ARTEP) is aimed more at collective training evaluation and proficiency, while SQT is aimed at individual training evaluation. But it almost goes without saying, well-trained units require proficient individuals. Even though TEC is designed primarily for individual training, it is a valuable tool in assessing and improving unit readiness. The pretests in TEC lessons can be quickly and easily administered to the appropriate MOS soldiers of an

entire unit to obtain a measure of
proficiency in critical tasks.
This will indicate to the commander
whether his troops are prepared for
collective training or maneuvers.
If the troops are not up to stand-
ards on key skills, the necessary
individual training can be programmed
before collective training begins.
One of the big advantages of TEC
comes into play at this point.
Instead of taking the entire unit
through a series of platform
lessons and field demonstrations
on all of the critical tasks, the
training can be individualized.
Soldiers can be assigned simul-
taneously to different lessons in
accordance with their training
needs. What is more, these lessons
are performance-oriented and
validated. The end result should
be less time spent in training
with more effective standardized
training. The bottom line for the
TEC manager is the same as it was
before with EPMS: TEC lessons
should interlock with the overall
training development effort.
For TEC, together with the other
elements of individual and collec-
tive training, is part of the pillars
in the "Greek Temple" illustration
which you see in several TEC publi-
cations. This illustration captures
the essence of the Army Training
philosophy. It shows the building
block approach and the systematic
interrelationships between philo-
sophy, tasks, methods, and results.
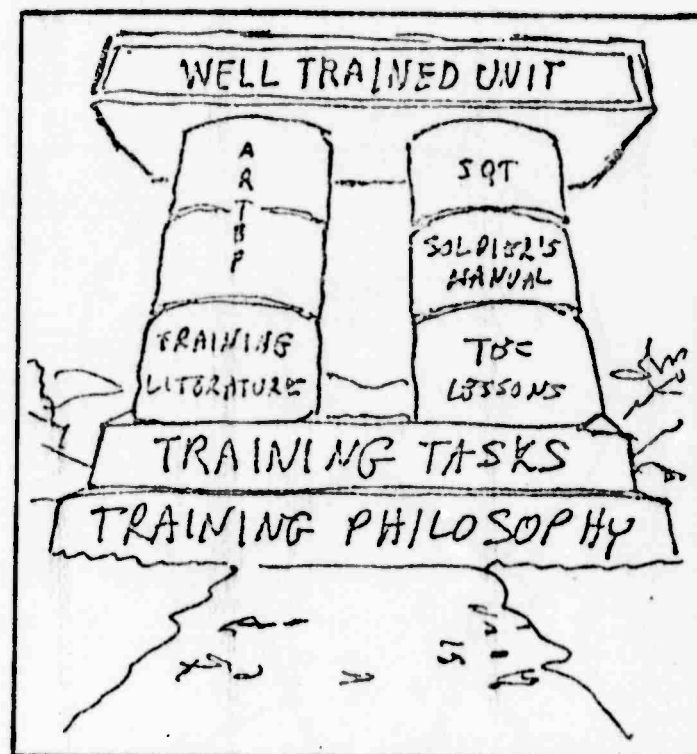
We have been making many claims about the benefits of TEC, but what, you may wonder, is the evidence that supports these claims. There are, in general, two types of evidence. The first is internal; it is the type of evidence that accumulates from the "built-in" process of developing and validating TEC. The second type is external, and results from external agencies, such as the Army Research Institute for the Behavioral and Social Sciences, conducting evaluations of TEC. Altogether, the evidence acquired so far is too massive to include in this document, but we can give you a summary of the types of evidence, and the general results.

Internal Evidence. The strongest internal evidence is obtained during the validation process. During the development phase, each lesson is tried-out on an appropriate number of soldiers to determine whether the lesson teaches what it is supposed to teach. No lesson is approved for reproduction and distribution unless it meets the validation standards established by the proponent school. If the tests used in the lesson were validated, and appropriate sampling procedures were followed, then the lesson validation process provides strong evidence in support of the lesson. You may be flattered to know that no other organization in the world that even approaches the size of the U. S. Army is using such a systematic, rigorous approach to training development. Additional anecdotal evidence , although it is not numerical, is continuously received from TEC managers, training commanders, field commanders, and soldiers who have experienced the effectiveness of TEC. This is also important information since the lessons have to be well-received and used before they can be effective.
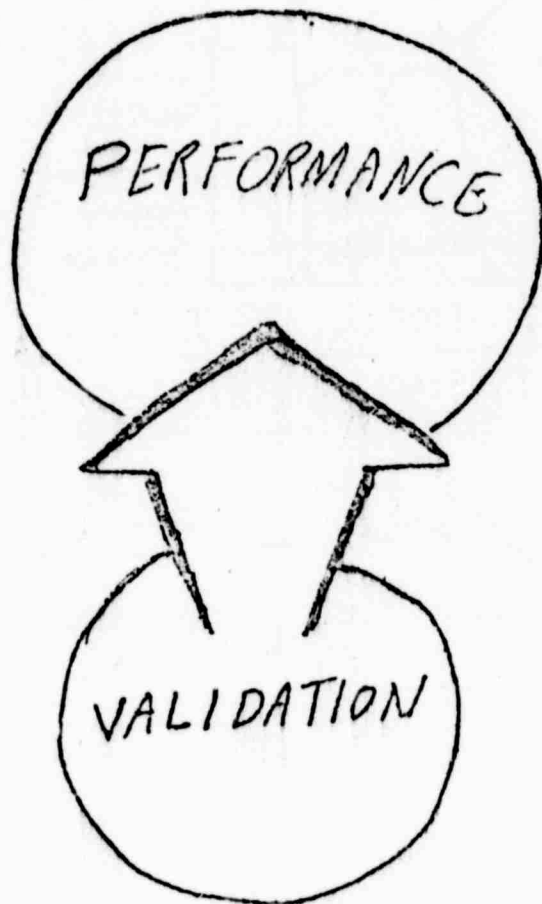
External Evidence. External
evidence has been obtained In re-
search studies conducted by the
Army Research Institute for the
Behavioral and Social Sciences (ARI).
These studies tend to indicate that
TEC is effective and that there are
several benefits to be derived from
the program. The data are not complete,
there are several studies underway as
this guidebook goes to press, but there
appear to be five conclusions that can
be drawn from the studies so far.

- TEC is effective. When
  soldiers use TEC, they
  learn from it; they be-
  come more proficient
  soldiers. Two different
  studies by ARI support
  this conclusion.

- TEC lessons, when properly
  developed and validated,
  will do a better job than
  conventional training.
  This conclusion has pre-
  liminary support in one ARI
  study, and is still being
  studied. When TEC is com-
  bined with conventional
  training, the results should
  be even better.

- TEC can be made available
  where other forms of train-
  ing are not. This should
  improve overall individual
  effectiveness, and a study
  is underway to help answer
  this question.

- TEC offers standardized,
  school developed and vali-
  dated instruction. This
  standardization helps insure
  all soldiers will receive
  the same high quality in-
  struction.

- When TEC is substituted for
  conventional training,
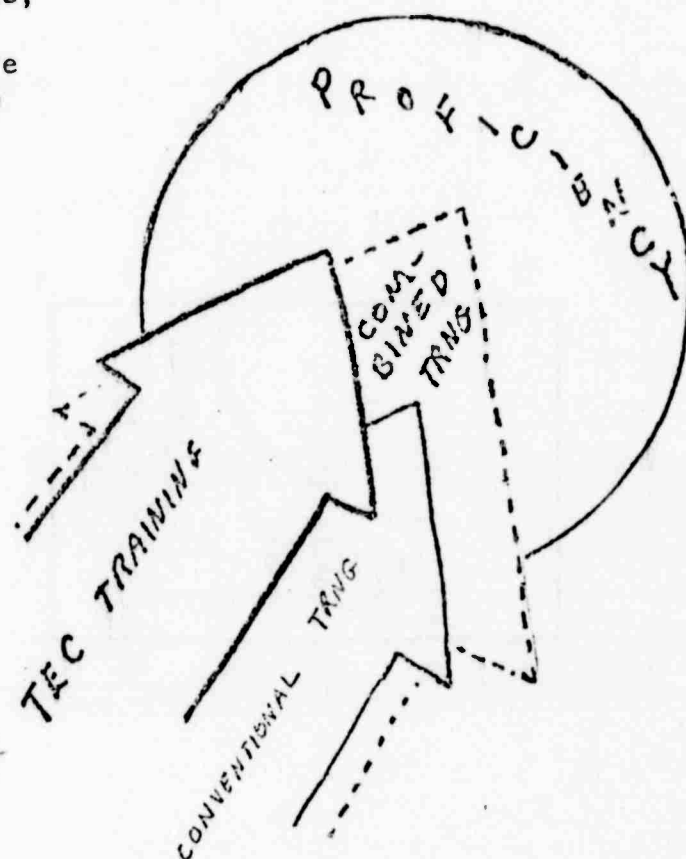
training development and administrative resources can be used to train in other areas. (Some TRADOC schools are doing this now!)

- TEC has been positively received by field units and research components. ARI personnel report they receive many volunteered comments in support of TEC as they conduct their studies. These comments indicate when soldiers and commanders use TEC, they like it and they think it is effecti
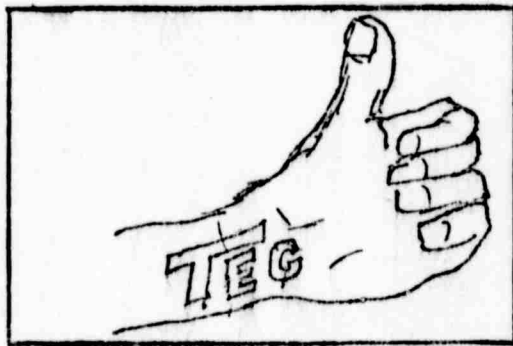
These benefits are important, not because TEC is trying to compete with other training alternatives, but because TEC is trying to fill an important need in the Army training. So far, the indicators of TEC's ability to meet this need are "thumbs up", and this success can be attributed directly to the motivation, dedicatic and capableness of TEC managers such as yourself.

1.2 ORGANIZATION OF TEC

Many agencies are involved in the complete TEC process, and it is difficult to represent the entire network on paper. This section and the following section describe many of these relationships. After you have studied these sections, and the portions of the manual dealing with the TEC development process, and have obtained some experience, you will become familiar with the entire process. Your understanding will grow most rapidly if you will reread these sections from time to time as you become familiar with the various agencies involved.

1.2.1. Organization of TEC at ATSC

The U.S. Army Training Support Center (ATSC) was established under the Training and Doctrine Command (TRADOC) at Fort Eustis, Virginia, on 1 July 1976. Its purpose was to harness the management of training support activities previously scattered throughout TRADOC. Its stated mission required ATSC to provide centralized management of training support activities for individual and collective training for Active Army and Reserve Component forces.

The responsibility still lies with the schools to develop courseware since that is where the subject matter experts are located, and that is where analysis and identification of training needs occur. ATSC provides the interface with other units (see illustration) that is necessary
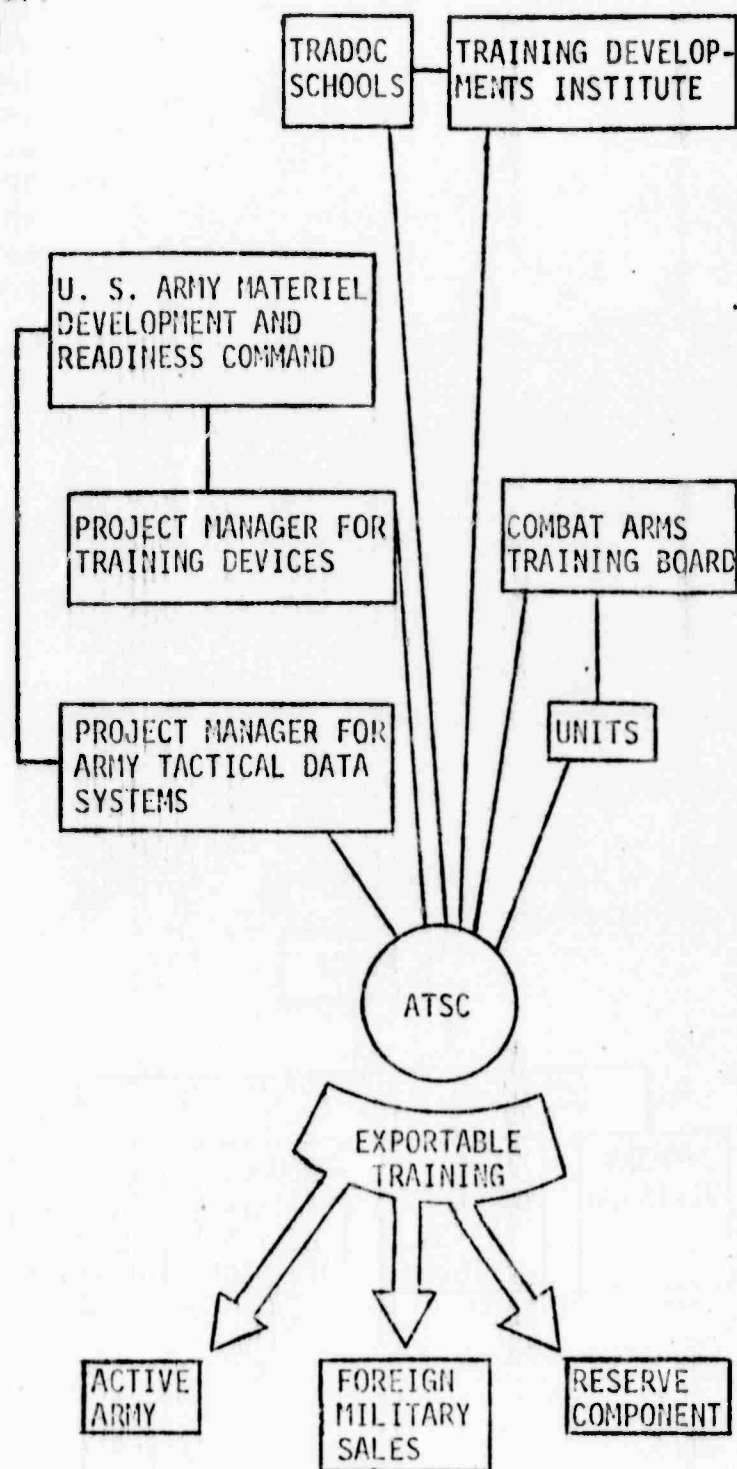
in the process of developing and distributing exportable training materials.

Operationally, ATSC is organized with a small staff, and six functional directorates. These directorates, one of which is Training Programs Directorate (TPD) have the primary operational role in exportable training support materials. TPD manages the programs involving the transmission of training via selected media. Included in this area are:

- Army Training Literature Program -- encompasses Soldier's Manuals, Field Manuals, How to Fight Manuals, and Training Circulars.

- Training Extension Course (TEC) -- the system of self-paced validated instruction utilizing a variety of media to be used in individual or small group instruction.

- Television/Motion Picture Program -- production and distribution of over 4,000 subjects, usually in 3/4-inch tape format.

In particular, TEC is managed by a division of TPD, the Army Training Extension Course Program (ATECP). ATECP comprises the four subdivisions shown in the wiring diagram.

```
                    +-------+
                    | ATECP |
                    +-------+
                        |
    +---------------+---------------+---------------+
    |               |               |               |
+----------+ +-------------+ +----------+ +-------------+
| SUPPORT  | | FIELD       | | PRODUCT  | | TEC         |
| DIVISION | | IMPLEMEN-   | | DISTRI-  | | DEVELOP-    |
|          | |  TATION     | | BUTION   | | MENT        |
|          | | DIVISION    | | DIVISION | | DIVISION    |
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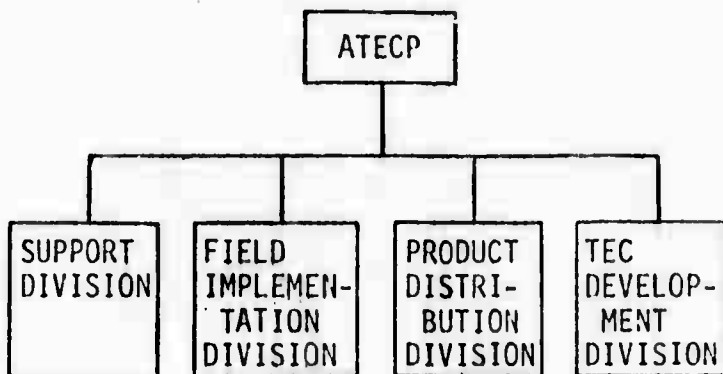
1.2.2. Organization of TEC within the Schools

There is a great variety in the
way TEC units are organized at the var-
ious schools. This statement will
come as no surprise to the exper-
ienced TEC manager, but it may be
helpful to the newly assigned manager
to realize that this diversity exists.
Therefore, the purpose of this section
is simply to describe the extent to
which schools do differ In the way
they have organized TEC. In some
schools, such as the Judge Advocate
General's School, TEC is developed
on a limited basis. The TEC manager
has other responsibilities besides
TEC. In other schools, such as
Infantry or Armor, the TEC staff is
large with a requirement for ten or
more personnel. It is normally the
case that the TEC Branch is located
in the Course Development Division,
but it may be In some other divis-
ion such as Training and Literature.
The TEC Branches also differ in terms
of the degree of centralization.
Some schools have a centralized TEC
Branch which is a separate entity,
and for which they provide resources.
In a few schools, TEC Is decentral-
ized In that it is not singled out
as a separate administrative entity.
In these schools TEC is handled con-
currently with other training
development responsibilities.

The point being made here is
that there are a variety of means by
which the goals of TEC are accomp-
lished. The important thing is for
you to become as knowledgeable as you
can of the responsibilities facing you,
of the different means of accomplishing
those goals that have been discovered
at other schools, and to utilize that
knowledge in the most effective way
possible at your school.

During a complete cycle of a TEC contract development, you will interact with representatives of all these agencies. In a general way, each of these agencies has a defined responsibility. However, the lines of communication and specific responsibilities do not stay the same. They change during different phases of the contract development. Accordingly, Section 1.3.1 explains the general responsibilities of each unit in order to clarify the purpose for each. Then Section 1.3.2 illustrates appropriate lines of communication for each phase of the contract.

SCHOOL RESPONSIBILITIES

● SPECIFY REQUIREMENTS

● PROVIDE GFM

● REVIEW FOR TECHNICAL AND DOCTRINAL ACCURACY

1.3.1 General Areas of Responsibility in TEC Contracts

The School. Before a TEC contract is written, each school to be included in the contract is asked to formulate a set of requirements for major subject areas to be covered and the number of instructional packages (kits) to be developed. These requirements are based on the school's needs and the guidelines provided by ATSC/TPU. After the requirements have been approved, the

school will prepare government furnished materials (GFM) for the contractor. These will be presented to the contractor when the contract is awarded, normally in incremental deliveries. After the contractor begins to develop the lessons, the school will review them at specified times with respect to technical and doctrinal accuracy. The school will also monitor the trial and validation process, and approve the 8mm answer print, proofs of camera ready copy, or answer print audio tape before the mass reproduction phase begins.

ATSC/TPD. The U.S. Army Training Support Center, Training Programs Directorate (ATSC/TPD) is responsible for establishing priorities for the overall TEC program. This includes long range plans for the rate of TEC lessons, and the role to be played by TEC in the total Army training program.

ATSC/TPD provides several services to the various schools participating in the program. They work with TRADOC DCSRM (Deputy Chief of Staff Resource Management) in providing the funding for the contract, and for each school's TEC-related administrative expenses (minus civilian salaries). They also participate with the schools in the planning and programming of lessons for development. Prior to the contract preparation phase, the ATSC/TPD project officer (PO) assigned to the fiscal year program will coordinate the preparation of contractual requirements. These requirements will be forwarded to Project Manager for Training Devices (PM TRADE) for preparation of a contractual package that adheres to the user requirements. After the contract has been awarded, the ATSC/TPD PO will monitor the process and help solve problems as they occur at all schools covered by that contract. The ATSC/TPD PO is

---

ATSC/TPD RESPONSIBILITIES

- ESTABLISH PRIORITIES

- PROVIDE FUNDING SUPPORT

- COORDINATE REQUIREMENTS

- SUPERVISE OVERALL TEC PROGRAM

- PROVIDE INTERFACE BETWEEN SCHOOLS AND PM TRADE

1-19

the school's point of contact (POC) for
all problems related to TEC. At various
times during the life of the contract,
you will be communicating directly with
the Contracting Officer's Technical
Respresentative (COTR), if one has been
assigned. This person is assigned by the
Government (PM TRADE or the Naval
Training Equipment Center - NTEC) to
supervise the contractor, and to repre-
sent the Government's interests. In
addition, you may have occasion to com-
municate directly with the contractor's
on site representative, if one has been
designated, the acquisitions director
(AD) from PM TRADE, and the NTEC Project
Engineer (PE). These contacts have
been established as part of the standard
operating procedures for TEC lesson
development and reproduction. But,
anytime there is a problem, or you have
a question about the TEC program, you
should contact your ATSC/TPD PO first.
It is ATSC/TPD's responsibility to
provide the interface between the schools
and PM TRADE or NTEC.

   PM TRADE. The Project Manager for
Training Devices (PM TRADE) assigns an
acquisition director (AD) to a given TEC
contract who directs and supervises all
contractual actions, development, and
reproduction based on requirements and
priorities established and directed by
ATSC/TPD. The AD will take the require-
ments presented by ATSC/TPD and incorporate
the requirements in the prescribed
government contracting format. Following
this, the procurement process will be
accomplished. After the contractor has
been selected, PM TRADE will, in selected
cases, assign a COTR who will reside at
the contractor's place of work. This
COTR will monitor and facilitate the
orderly progress of the contract during
the development phase. This COTR serves
as a direct point of contact between
the school and the contractor.

   The overall management and super-
vision of the contractual obligation is
the responsibility of the PM TRADE AD.

PM TRADE RESPONSIBILITIES

- SUPERVISE PROCUREMENT

- PROVIDE COTR IF REQUIRED

- SUPERVISE CONTRACT

- PROVIDE INTERFACE BETWEEN
  ATSC, NTEC, AND CONTRACTOR

1-20

This AD monitors contract performance, and directs and coordinates the development and implementation of remedial actions when contractual problems are identified. Ordinarily, this person does not communicate directly with the schools, as may the PM TRADE COTR, but serves as the interface between ATSC/TPD, PM TRADE, NTEC, and the contractor.

NTEC. The Naval Training Equipment Center (NTEC) provides experts to PM TRADE during the pre-award phase to evaluate the requirements and terms of the contract with respect to their feasibility and various legal issues. A Project Engineer (PE) is assigned to the contract to provide technical expertise in audiovisual engineering and to assist in cost and schedule controls, and subsequent validation of contract data in coordination with Defense Contract Administrative Services (DCAS). In addition, a COTR is placed by NTEC with the reproduction contractor. This COTR monitors progress during the reproduction phase, checks on the technical quality of audio and visual material, and serves as an interface between the school and the reproduction contractor.

Contractor. The contractor will analyze the GFM, and recommend, subject to approval by the school, the media to be used for a given lesson. However, the school has the final authority on media selection. The contractor will develop the required lessons in accordance with the development model approved for each contract. The lessons will be submitted to the school for review at designated junctures. The contractor will validate the lessons under the supervision of school representatives. Following validation, the lessons will be prepared in final form for reproduction. The development contractor normally accomplishes reproduction as well as lesson development. In some cases, however, the lessons are sent to a separate reproduction contractor.

NTEC RESPONSIBILITIES

- PROVIDE AUDIO VISUAL EXPERTISE TO PM TRADE AND THE SCHOOLS

- PROVIDE REPRODUCTION COTR

- JUDGE TECHNICAL QUALITY OF LESSONS

CONTRACTOR RESPONSIBILITIES

- ANALYSIS

- MEDIA SELECTION

- LESSON DEVELOPMENT

- VALIDATION

- REPRODUCTION

1.3.2 Lines of Communication

PRE-AWARD PHASE
COMMUNICATIONS*

```
        SCHOOL

      ATSC/TPD PO

      PM TRADE AD

          NTEC PE &
          CONTRACTING

  BIDDING
  CONTRACTORS
```
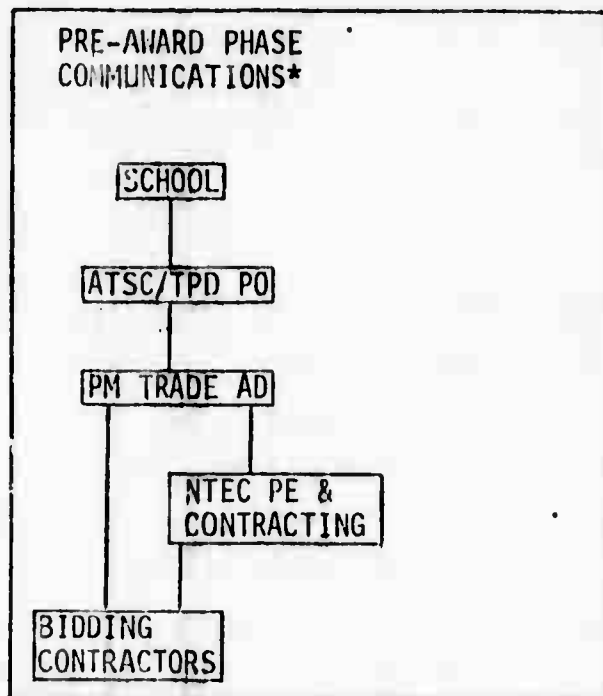
Pre-Award Phase. While the contract is being written, your point of contact (POC) for all TEC related matters is your PO at ATSC/TPD. The PO will coordinate requirements, communicate with PM TRADE, and participate in the contractor selection process. The PM TRADE representative will communicate with NTEC, and manage the contract preparation and negotiation phase.

DEVELOPMENT PHASE
COMMUNICATIONS*

```
              SCHOOLS

  CONTRACTOR'S          ATSC
  ON SITE REP            PO

  PM TRADE COTR         PM TRADE
                          AD

  CONTRACTOR            NTEC PE

  ANSWER PRINT PREPARATION

    NTEC COTR

    REPRODUCTION
    CONTRACTOR
```
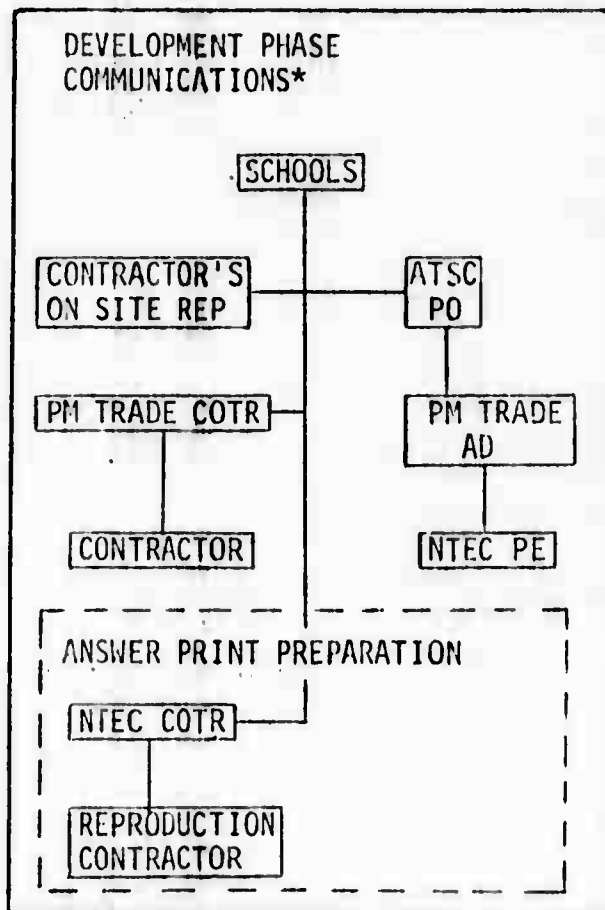
Development Phase. Your primary POC is still your ATSC/TPD PO. This PO should be contacted in the event of questions or problems related to the contract. Two additional POCs you may encounter during this phase are the contractor's on site representative at your school, and PM TRADE's COTR at the contractor's place of business. Communications concerning the routine development procedures should be directed to these persons. However, in the event of problems, you should first contact your ATSC/TPD PO. This PO will contact the PM TRADE AD as necessary to follow-up on the problem.

*These diagrams illustrate, in a simplified way, the changes in lines of communication during each phase of the contract. They do not illustrate all possible communications that might occur during a contract.

Reproduction Phase. The procedures here are essentially the same as during the development phase. The difference is that, in some cases, you will now be in communication with an NTEC PE. As before, the COTR should be contacted at once in case of problems.
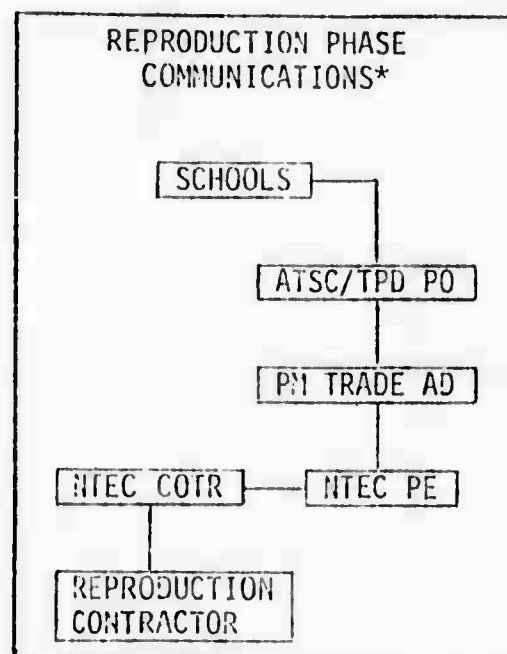
REPRODUCTION PHASE
COMMUNICATIONS*

```
                SCHOOLS ──────────┐
                                  │
                       ATSC/TPD PO
                                  │
                       PM TRADE AD
                                  │
  NTEC COTR ────── NTEC PE
      │
  REPRODUCTION
  CONTRACTOR
```

There is no simple way to present a list of responsibilities and guidelines for a TEC Development Manager. There are several reasons for this:

- Differences in contractual requirements

- Differences in working conditions

- Differences in personal style

- Differences in preparation for project management responsibilities

Despite these differences, the goal in this section of the Guidebook is to provide guidance, especially for the newly assigned TEC Development Manager, with respect to his or her responsibilities. This section will also introduce you to some of the general characteristics of project management, and suggest methods for you to obtain additional information and training relevant to your responsibilities.

TEC DEVELOPMENT MANAGERS

- RESPONSIBILITIES

- PROJECT MANAGEMENT

- TRAINING OPPORTUNITIES

1.4.1 TEC Development Manager Responsibili!

Diversity of Responsibilities. The responsibilities assigned to a TEC manager are defined, to a large extent, by the contract. But, a limitation to the contract as a source of a "job description" is that it describes the ends but not the means. It tells you what you must accomplish, but not always how to accomplish it. A complete job description, or management guidebook, should describe how to accomplish the task. But, in the case of the TEC manager, there is still another complication. There is, as previously indicated, great diversity among the schools as to the ways TEC is developed. Some schools work entirely on contract, others do some

in-house development. Because of these, and other, differences in working conditions, it is important for the TEC manager to become competent in the general skills of project management, and to discover or utilize the most appropriate means to accomplish the goals in a given school. This section contains an overview of some of the responsibilities related to contract management, and the next section (1.4.2) describes some of the general characteristics of project management.

General Categories of Responsibilities. One category of responsibility is derived directly from the contracting process. Since these change from contract to contract, and can be derived directly from the contracts, they will not be presented in detail here. However, for purposes of orientation, we will summarize the types of responsibilities associated with contract obligations. They fall roughly into three categories: definition of requirements, preparation of government furnished material (GFM), and supervision of contractor's work. The first category includes the work that goes into preparing the request for proposal (RFP) which, eventually, will become the contract. Each school to be included in the contract works with ATSC/TPD to define what their requirements will be for the contract. Criteria varies from fiscal year (FY) to FY for selecting subject material, but support of EPMS can be expected to always be a major consideration. Once subject material and kits have been determined, you then move into the second category of responsibilities: preparation of GFM. As soon as the contract has been awarded, and the contractor is ready to begin work, you must be prepared to give him all of the back-up material he will need in order to be able to do his job. After turning this material over to him, you then enter your third phase of responsibilities: supervision of contractor's work. It is this phase

```
CONTRACT RESPONSIBILITIES


• DEFINITION OF REQUIREMENTS

• PREPARATION OF GOVERNMENT
  FURNISHED MATERIAL (GFM)

• SUPERVISION OF CONTRACTOR'S
  WORK
```

of your responsibilities that is
usually spelled out in detail in the
contract. Sometimes your supervision will
be indirect in that you will be critically
evaluating decisions (e.g., media
selection recommendations) and products
that are presented to you by the
contractor. At other times, your
supervision will be direct as when you
oversee the contractor's procedures
while he conducts validation studies
of the lessons. But, in all cases,
it is important for you to remember that
in conjunction with your subject matter
experts (SME) and higher level staff,
it is your responsibility to make
judgments on the technical and doct-
rinal accuracy of the contractor's
product. Assurance that the kit
meets contractual specifications rests
with ATSC/TPD, PM TRADE, and NTEC.

Rate-of Progress Responsibility.
This could have been included in the
general categories of responsibilities,
but it is so important that it deserves
special attention. The TEC program
is young, it has grown rapidly, and
it has, predictably, encountered some
log jams. Both the contractors and the
Army have had to slip their production
and review schedules, and there have
been delays in reproduction and
distribution. But, the time of
tolerance for these delays is past.
These log jams have to be prevented,
and TEC has to be kept on schedule. To
emphasize the importance of keeping TEC
on track, TEC is a major area of interest
in the commandant's installation
contract. TEC products are accounted for
and reported quarterly to the commander
of TRADOC. Unless TEC can demonstrate
both that its products are effective,
and that its products are being
produced and fielded in an acceptable
length of time, the entire program will
be jeopardized. Since several studies
have demonstrated the effectiveness of
TEC, that leaves us with the second
problem as the major issue. The Army
must always meet its schedule of
deliverables and reviews. Only in this

● KEEP TEC ON TRACK

way can the Army then take a firmer
line, if necessary, with contractors who
persistently have trouble meeting dead-
lines. Needless to say, the primary
responsibility for meeting the time schedules
falls upon you since there are many school
reviews In the development cycle. Only
with your effective management can TEC
stay on track!

  Sample Job Description. The following
example, which is a composite based upon
samples received from the Transportation
School and the Quartermaster School,
describes the responsibilities of a TEC
Development Manager (Branch Chief), TEC
Project Officer at the school, educational
specialist, and writer-editor (not to be
confused with SME's). This example
illustrates the diversity of responsib-
ilities relevant to achieving the ob-
jectives of TEC. This example is not
suggested as a model for all schools.
For example, it
does not include responsibilities for
in-house development, which would he
included at some schools. Furthermore,
some schools do not have staffs which
are large enough to allow this breakdown of
job descriptions. In those cases, many
of these tasks would be the sole
responsibility of the TEC manager, or
distributed in a different manner among
two or three people.

JOB DESCRIPTIONS - EXAMPLES

TEC Development Manager

(1) Supervises TEC Branch operations and development of all TEC lessons.

(2) Secures SMEs and validation samples.

(3) Coordinates TEC with other relevant units of the Training Programs Directorate.

(4) Supervises relationships between the TEC Branch and the civilian contractor.

(5) Serves as initial point of contact for the contractor on all lesson development.

(6) Attends all meetings with the contractor.

(7) Determines long-range lesson development requirements.

(8) Plans annual input for operational budget.

(9) Determines and assigns duties.

(10) Reviews and coordinates contractor lesson proposals throughout the development process.

(11) Reviews and approves all outgoing correspondence.

(12) Serves as member of the TEC Review Committee.

TEC Project Officer

(1) Provides direct supervision in development of TEC lessons within a specific MOS/subject category.

(2) Directly supervises the efforts of the TEC support writers and subject matter experts working on lessons for which he is responsible.

(3) Coordinates and attends individual and group trials.

(4) Coordinates collection, review, annotation, and delivery of government furnished materials to the contractor.

(5) Supervises preparation of the Coordination and Contract Summary Sheets.

(6) Insures that all lesson development (both school and contractor efforts) remains on schedule.

(7) Keeps Chief, TEC Branch aware of status of individual lesson development.

(8) Arranges for and is present at delivery of GFM.

(9) Serves as member of the TEC Review Committee.

Educational Specialist

(1) Provides professional expertise on instructional technology.

(2) Recommends the development and application of advances in training technology.

(3) Reviews overall TEC lesson objectives.

(4) Reviews, analyzes, and critiques programmed learning sequences, criterion-referenced tests, and lesson materials.

(5) Assists in government participation in individual and group trials.

(6) Assists in determining long-range lesson development.

(7) Provides guidance for the development of tests and testing procedures.

(8) Makes recommendations on media and methods of presentation.

(9) Provides guidance to the Project Officers.

(10) Accompanies TEC Program Coordinator during conferences and on-site visits with the contractor or other schools, as necessary.

(11) Serves as member of the TEC Review Committee.

Writer-Editor

(1) With assistance from the subject matter experts, prepares the Coordination and Contract Summary Sheets.

(2) With assistance from the subject matter experts, collects, reviews, and annotates government furnished material for the contractor.

(3) Assists in reviewing contractor developed material within the TEC Branch.

(4) Assists the Project Officer in maintaining cost data.

Bibliography for 1.4.1

Mager, R. F. Preparing instructional objectives. Belmont, California: Fearon Publishers, 1962. (Contains procedures for developing objectives for instructional material.)

Mager, R. F. Goal analysis. Belmont, California: Fearon Publishers, 1972. (A good reference for the development of instructional objectives.)

Mager, R. F. & Pipe, P. Criterion-referenced instruction. Palo Alto, California: Mager Associates, Inc., 1976. (A complete set of workbooks that describe the design and the development of criterion-referenced instruction.)

TRADOC PAMPHLET 350-30. ISD-Executive Summary. Fort Monroe, Virginia: U.S. Army Training and Doctrine Command, August 1975. (Provides overview of ISD model.)

TRADOC PAMPHLET 350-30. ISD Phase II. Fort Monroe, Virginia: U.S. Army Training and Doctrine Command, August 1975. (Provides information on the design of instructional material.)

TRADOC PAMPHLET 350-30. ISD Phase III. Fort Monroe, Virginia: U.S. Army Training and Doctrine Command, August 1975. (Provides information on the development of instructional material.)

1.4.2 General Project Management Characteristics

Management Versus Leadership.
Too often in the military, industry, and education, it is assumed that because an individual has leadership skills and training, he or she is prepared to assume the responsibilities of project management. Although similarities exist, there are many aspects of project management that require more than leadership. Both an understanding of the special nature of development projects, and the appropriate management techniques are required. In this section of the Guidebook an orientation to the characteristics and problems of project management are provided. For the newly assigned TEC manager without previous project management experience, this orientation and some study of the references accompanying this section, will help you begin to function effectively. You should also feel free to call upon your ATSC/TPD PO, and experienced colleagues at other TEC schools. They will be more than happy to

- A MANAGER HAS TO BE A GOOD LEADER

- A GOOD LEADER IS NOT ALWAYS A GOOD MANAGER

share their experience with you. As
you work in this assignment, you will
descover that TEC development managers are
enthusiastic and willing to do what
they can to help a colleague as a means
of helping   obtain the highest
quality program possible.

What is Project Management? Almost
all definitions of project management
inculde or imply the following elements:

> The project manager, by working
> with people and other resources,
> must produce the product, or
> other outcomes defined by the
> objectives of the project, on
> time, according to standards,
> and within the allocated budget.

This definition implies certain skills
that are important for a project manager
to possess:

PROJECT MANAGERS SHOULD HAVE

- INTERPERSONAL SKILL

- ORGANIZATIONAL SKILL

- ANALYTICAL SKILL

- TECHNICAL SKILL

- Interpersonal Skill: To an
  increasing degree almost every
  expert in management emphasizes
  the importance of interpersonal
  skills in project management.
  Even in a hierarchical organization
  such as the Army, a successful
  project is the result of the
  coordinated efforts of many people.
  It will always be the case that
  some of these people are not in
  the hierarchy under the personal
  control of the TEC manager. The
  successful TEC manager is able to
  enlist the assistance of people
  whose expertise or resources are
  needed, even when there is no
  immediate obvious payoff for those
  people. Even when key people are
  in the command of the TEC manager,
  projects will not make satisfactory
  progress unless these people are
  motivated and productive.

- Organizational Skill: The successful
  TEC manager is able to maintain a
  vision that is larger than his

immediate area of responsibility.
The best project managers, in
industry and education as well as
the miliatary, are able to concep-
tualize the "big picture," and have
their work fit into it. Having this
perspective helps the project
manager make decisions that are in
the best interest of the project
and the larger organization.

- Analytical Skill: Just as the whole
picture is important, so are the
details. The effective project
manager is able to break the whole
down into pieces, and to have an eye
for the detail that comprises each
of the pieces. A concern for detail
will not, by itself, automatically
result in excellence, but there will
be no excellence without a concern
for detail. This does not mean that
the TEC manager has to keep personally
in touch with every detail of every
lesson that is being developed, but
it does mean that he can perceive
the detail when need be. And it
means that he instills this concern
in his personnel.

- Technical Skill: Knowledge of the
product or its contents, and
experience with project management
are both helpful. The TEC manager
should know at least enough about
the content areas so that he can
judge the work of the subject matter
experts (SMEs) who may be working on
a project. If he does not have that
knowledge, he should make an effort
to acquire it. Similarly, experience
in project management is valuable
for the simple reason that many
unprogrammable decisions have to be
made. The experienced manager will
be far better equipped to handle many
of the uncertainties associated with
project management. This, of course,
leaves us with the obvious dilemma
of what does the inexperienced project
manager do? The main thing is to
understand that it is normal to have

to make decisions in the face of
uncertainty, and to learn as much
as possible from experienced
colleagues.

*Characteristics of Project Manage-
ment Versus Other Leadership
Assignments.* Generally speaking, as
a TEC manager, you have, or might,
encounter the following types of leadership
assignments: commander, administrator, or
project manager. The requirements of
each differ in important ways. For
example, command responsibility requires
that you establish policy within your
sphere of decision making, and that you
be primarily concerned with commanding
people rather than supervising processes.
The other two types of leadership
responsibility both require the supervis-
ion of processes, but they, too, differ
significantly. Managers have to set
policies, determine standards, make
unprogrammed decisions, and cope with
a high degree of uncertainty due to
the degree of non-repetitiveness in
projects. Administrators, on the other
hand, are concerned with implementing
policy, and they tend to deal mostly with
structured, predictable, and relatively
unambiguous situations. As you can see,
project management requires the very type
of personal initiative and decision
making that is discouraged in more
structured, administrative assignments.

Development projects have several
characteristices that distinguish them
from most other organizational units.
In general projects are:

- Objectives oriented: A project
  exists for the sake of producing a
  product, or other tangible outcome.
  Only those tasks are assumed by a
  project that lead to the accomplish-
  ment of the objectives.

- Non-repetitive in whole or part:
  Once the objectives have been
  achieved, the project is finished.
  There may be overlapping or sequent-
  ial projects which are the responsi-
  bility of the same personnel, but
  each project has a definite goal and

PROJECT MANAGEMENT IS

- OBJECTIVES ORIENTED

- NON-REPETITIVE

- TIME-BOUND

- INTER-ORGANIZATIONAL

1-32

time-line. Even though the other projects may be similar, and experience with one will transfer to the next, there will still be unique, non-programmable problems and decisions to be made. This results, in part, from changes in specifications, personnel, and other resources.

- Time-bound: A project carries due dates. Often the products from one project have to interface with another project. Frequently, there are serious, negative consequences if a manager cannot meet deadlines.

- Inter-organizational: Projects have a tendency to cut across established organizational boundaries. This happens because a project will often require experts and resources that are not available in the parent organization. Since projects are often one-shot endeavors, it could be inefficient to incorporate all of the required resources into the parent organization. Therefore, the project manager often has to be skilled at locating and utilizing resources from diverse sources.

The Function of a Manager. Classically, the functions of a manager are defined as planning, organizing, directing (or motivating), and controlling.

- Planning: Planning is future oriented. The manager must identify objectives, and prepare time-lines, budgets, policies, and staffing requirements that will facilitate their accomplishments.

- Organizing: The manager must identify resources, prepare job descriptions, delegate tasks, establish patterns of communications, and integrate all project activities toward the goal of accomplishing the project objectivies.

MANAGERIAL FUNCTIONS

- PLANNING

- ORGANIZING

- DIRECTING

- CONTROLLING

- Directing (motivating): The
  manager must exert leadership,
  and other types of influence,
  so that subordinates will
  accomplish their tasks. The
  manager must be able to
  delegate authority, and to
  secure cooperative working
  relationships with other units.

- Controlling: The manager must
  exercise quality control by
  comparing performance to
  standards and correcting discre-
  pancies. This applies to
  process events, such as
  personnel performance, and to
  product characteristics.

The TEC manager's responsibil-
ities that were described in the last
section (1.4.1) fit conveniently into
these four functions, but these funct-
ions are broader than the earlier list.
The earlier list describes your
"ends-oriented" responsibilities.
They were the tasks that are directly
related to the development and
completion of a TEC contract.
The four functions presented in this
section also include "means-oriented"
responsibilities. For example, under
planning, you must do more than plan
the requirements of the contract.
You must also plan your internal
organization and time lines. Then,
you will need to implement the
organizational plan, supervise the
personnel, and maintain quality
control. Some of these broader, means-
oriented, responsibilities are embedded
in the example presented in the
previous section (See Sample Job
Description in Section 1.4.1).

Common Problems in Project Management.
There are certain problems that occur
so often in project management, that they
do not fit into our normal definition
of a problem. Usually, we think of a
problem as an out-of-the-ordinary

impediment to progress. Once we solve the problem, we either do not expect it to occur again, or we have a solution ready for it. Such is not the case in project management. There are several categories of problems that are recurrent, but the solutions tend to differ each time because of the nature of projects. Therefore, we will describe some of these problems so you will be aware of them, but we cannot present simple solutions. The solutions will result from your overall knowledge of your project and its objectives, your general problem solving ability, your experience, and your ability to draw on the experience of others.

- Hierarchical versus horizontal relationships: Often you will need personnel, such as subject matter experts, and services from units over which you have no direct authority. Securing this cooperation in timely manner often poses a real challenge to achieving your milestones on schedule.

- Deadlines versus quality: No project manager wants to turn out products which are not high quality, and it is imperative that the Army have high quality training materials. However, some project managers can get into trouble by striving for an excessive degree of perfection that interferes with getting the products out on time. It is always possible to identify one more revision that can be made on a product; it can be a never ending cycle. Achieving top quality products, and getting them out on time is a real challenge to any project manager.

- Responsibility versus authority: Even though the project manager has the responsibility for achieving the project's objectivies, he does not always have complete authority over personnel, schedules, budget, or

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MANAGERIAL PROBLEMS

- HIERARCHICAL VS HORIZONTAL RELATIONSHIPS

- DEADLINES VS QUALITY

- RESPONSIBILITY VS AUTHORITY

- DETAILED SUPERVISION VS MANAGEMENT BY EXCEPTION

- PROJECT PRIORITIES VS ORGANIZATIONAL PRIORITIES

1-35

performance specification. This can
be particularly vexing to the project
manager since it curbs his sphere of
decision making.

- Detailed supervision versus management
by exception: The project manager is
accountable for the outcomes of the
project, but in a complex project, it is
impossible to supervise every detail of
every event. The manager has to manage
by exception to some degree; that is, he
has to identify sensitive or critical
events and observe only those. He moves
into the role of detailed supervision only
when there is a problem. Being able
to identify the critical points and
achieve the right balance of supervision
is a real source of problems.

- Project priorities versus organizational
priorities: Projects, by their very
nature, tend to become ends-in-them-
selves. The TEC manager may begin to see
TEC as the panacea for all training problems.
The commander of a field unit, who
has no vested interest in TEC, may
see it as only one of several resources
as he attempts to build a well trained
unit. Failure to obtain a larger
perspective than one's immediate
responsibility can create many problems
for a project manager.

Bibliography for 1.4.2

Cook, D. Educational project management. Columbus, Ohio: Charles Merrill,
1971. (Provides guidance on managing educational development systems.)

Hersey, P. & Blanchard, K. H. Management of organizational behavior:
Utilizing human resources. New York, New York: Prentice-Hall Inc.,
1969. (Gives details on organizational management.)

Newport, M.G. The tools of managing. Reading, Massachusettes, 1972.
(Describes principles of management.)

Training Circular 21-5-1. Training management digest - Training management:
An Overview. Fort Monroe, Virginia: U.S. Army Training and Doctrine
Command, April 1973. (Provides details on military training management.)

Training Circular 21-5-2. Training management digest - Peformance-oriented
training. Fort Monroe, Virginia: U.S. Army Training and Doctrine
Command, June 1974. (States the principles of performance-oriented traini

1.4.3 Dealing with Contractors

General Background. A considerable
amount of your time will be spent in
interactions with your contractor.
And, to a great extent, the success
of your project will depend upon
your ability to develop a productive
working relationship with your
contractor. Therefore, it is important
for you to know how to deal with
contractors in terms of techniques,
responsibilities, authority, and
legal boundaries. With respect to
techniques, it is impossible to present
a list of clear-cut procedures.
Most individuals will, with expereince,
work out their own best methods of
managing contracts. However, this
problem has been researched by
scientists, especially Industrial
psychologists, and there is a
growing literature on the subject
of contractual relationships. The
one idea that we would like to bring
to your attention from this literature,
is the concept of formal versus
informal contracts. This concept has
proven useful to managers who have to
supervise contracts in the process
of fulfilling their project objectives.

The formal contract is the legal
contract. It consists of the stated
agreements In the signed contract.
The informal contract refers to the
psychological aspects of the relation-
ship. It consists of all the unstated,
or difficult to state, expectations
of the two parties to the contract.
It is very important to consider both
of these aspects in relation to your
TEC contract, or any local contracts
you might write in support of in-
house development. Your responsibility
and authority in relation to the
formal contract are discussed later in
this section.

Expectations can differ in many
ways when contracting the software.

TO DEAL EFFECTIVELY WITH
CONTRACTORS

- WORK WITHIN BOTH FORMAL
  AND INFORMAL CONTRACTS

- RECOGNIZE THE ASPECTS OF
  DEVELOPMENT WHERE EXPECT-
  ATIONS (BOTH SCHOOL AND
  CONTRACTOR) MIGHT DIFFER

It is, on the one hand, fairly
easy to define a time-line for
deliverables and reviews, and to
define the deliverables in general,
descriptive terms such as kits, lessons,
final art, etc. On the other hand,
it is extremely difficult to work
out the detailed specifications.
When you contract for a generator,
it is relatively easy to specify
many characteristics of the final
product in terms of its composition,
output, and durability. But, with
educational software, the problems
are far more complex. The complexity
results from the lack of a technology
which allows us to specify every
important learning and motivational
characteristic of a lesson in terms
of a particular arrangement of words
and pictures. It also results
from the degree of human interaction
that occurs during the development
process. This offers many opportunities
for the TEC manager and the contractor
to have very different expectations
about the desires and obligations of
each other.

An example might help. Every
TEC contract requires the TEC managers
to provide GFM for the contractor,
and some guidelines are provided.
But there is still an unanswered
question as to how detailed the GFM
should be. Some schools provide
coordination and contract summary
sheets that are almost detailed
enough to be used as draft scripts.
Other schools provide an outline with
technical back-up information and
expect the contractor to write
scripts. The expectations of the
schools differ greatly with respect
to the amount of detail in art. This
can be a substantial problem for a
contractor who deals with several
schools and the expectations of
each school are different. Therefore,
it is important for the TEC manager to
learn to recognize the many aspects

1-38

of development where expectations
might differ, and to discuss these
with the contractor. Many hours,
and days, of development time can
be saved by establishing an effective
working relationship.

Responsibilities and Authority.

The responsibilities of the TEC manager
are included in each TEC contract. Since
they are not exactly the same in each
contract, you should study each contract
and develop some type of checklist for
reference and guidance. With respect
to authority, you are not authorized to
deal directly with a contractor or make
agreements which obligate the govern-
ment or effect changes in the contract.
If any problems occur relative to the
terms of the contract, you should contact
your ATSC/TPD PO who will assist you
in following it through to the contract-
ing officer. You are required by the
contract to make important judgments about
the contractor's work. These include
media selections, technical accuracy,
quality of art, and overall quality of
the lesson as specified by the contract.
It is important for you to exercise this
authority and not rely on the contractor's
judgment.

The contractor is an expert in his
field, but you represent the target
population. It is up to you to be
concerned with the most cost effective
methods of development, and the accept-
ability of the products to the users.

Local Contracting.

Contracting locally
for services to assist with in-house
development presents many special
problems. In order to do so, you should
have considerable experience with
whatever you are contracting for, and
with the regulations concerning procurement.

- KNOW THE CONTRACT

- DEVELOP REFERENCE AND
  GUIDANCE CHECKLISTS

DETERMINE

- THE MOST COST EFFECTIVE
  METHODS OF DEVELOPMENT

- THE ACCEPTABILITY OF THE
  PRODUCTS TO THE USERS

LOCAL CONTRACTING PROBLEMS

● JUDGING PROPOSALS

● KNOWING GOVERNING
  REGULATIONS

First, unless you have experience
with the services you are buying,
it will be difficult for you to
judge proposals with respect to
time, costs and quality. Second,
you may encounter many difficulties
unless you learn the regulations
governing this type of procurement.
Your local procurement office can
work with you on such a contract.
Before beginning this type of con-
tractual activity, however, you
should talk with some experienced
TEC managers. Your ATSC/TPD PO will
be able to recommend some names to
you.

1.4.4 Training Opportunities

Workshops. At present, there
is one workshop that is available
to TEC personnel. This workshop,
Criterion Referenced Instruction
(CRI), is offered by Training De-
velopments Institute (TDI), TRADOC.
It is currently being offered at
regular intervals at a variety of
locations, and a large number of
TEC personnel have participated.
You should contact your ATSC/TPD PO
for more information about this
workshop.

References. Much of your
training will have to result from
your personal reading and on-the-
job experience. There are many
publications, both military and
civilian, on the topic of train-
ing, and the preparation of train-
ing programs and materials. In
this chapter, we have included a
few of the most salient in con-
sideration of the responsibilities
of TEC manager. If your interests
go beyond these, the bibliographies
in these publications will guide
you to the larger area of literature

CHAPTER 2

PLANNING AND ADMINISTRATION

OF A TEC UNIT

CONTENTS

CONTENTS (continued)

2.0 PLANNING AND ADMINIS- TRATION OF A TEC UNIT

During the last decade, a significant advance was made in the field of training development. It resulted from applying general systems theory to the process of training and educational development. The impact of this planning technique was so dramatic that it contributed to the development of a new field of specialization known as educational, or instructional technology. Initially, this technology was developed in colleges and universities, and In industry, but it has now been adopted by the Army and other branches of the service. As a member of the TEC program, you will see this technology being applied on a broader scale than ever before. It is a large project that involves virtually every school and unit in the Army.

The purpose of this chapter is to present a systematic approach to course development. This is accomplished by:

- Describing the relationships between TEC, the Instructional Systems Development (ISD) model, and Directorates of Training Development.

- Explaining how Subject Matter Experts (SMEs) are used.

- Reviewing recurring report requirements.

PLANNING AND ADMINISTRATION OF A TEC UNIT

- SYSTEMATIC COURSE DEVELOPMENT

- TEC AND ISD

- PLANNING REQUIREMENTS

- SUBJECT MATTER EXPERTS

- RECURRING REPORTS

2.1 SYSTEMATIC APPROACHES TO COURSE DEVELOPMENT

In its broadest scope, the systems approach has moved beyond TEC; it has been adopted by the U.S. Army Training and Doctrine Command (TRADOC) as a means of planning and implementing a total training concept. This concept (see Section 1.1.6) will result in a totally integrated and validated performance-oriented training program for the Army.

In this section of the Guidebook, we will introduce you to the systems approach, particularly as it is represented in two documents that are widely distributed among Army training development personnel. The first of these is TRADOC Pamphlet 350-30, Interservice Procedures for Instructional Systems Development. The second, Criterion-Referenced Instruction by R. F. Mager and P. Pipe, is available through a workshop conducted by TDI, TRADOC which is frequently attended by school training personnel.

2.1.1 Systematic Course Development

Cautionary Note. We have to open this section with a caution: there are many ways of portraying the systems approach to instructional development. A

recent graduate student
of instructional technol-
ogy identified over 40 dif-
ferent models that have
been published in the lit-
erature of the field.
Therefore, we cannot say
that there is one best
model for development.
Models vary depending upon
the circumstances in which
a given project takes place.

Overview. Despite this
diversity, there are, at an
abstract level, some features
that are common to most of
the models. Most of them
begin by doing a needs anal-
ysis or a problem analysis,
and a task analysis in order
to determine what tasks are
to be included in the train-
ing program. The second
major group of steps in-
volves the specification
of objectives and tests;
that is, the observable
outcomes of the program are
described, and methods to
measure them are developed.
The third major group of
steps includes the design
of an appropriate sequence
of instruction, and the
selection of an appropriate
strategy for instruction.
This would include media
selection. The fourth
group of steps, often
called development, includes
the preparation of an initial
version, a try-out, revision,
and validation in order to
see whether the training
material meets the objectives.

SYSTEMATIC COURSE DEVELOPMENT

- NEEDS ANALYSIS AND TASK
  ANALYSIS

- SPECIFICATION OF OBJECTIVES
  AND TESTS

- DESIGN OF INSTRUCTION

- DEVELOPMENT OF INSTRUCTION

- IMPLEMENTATION OF INSTRUCTION

After the validation is finished, the last phase begins. This fifth phase, or implementation, includes the process of putting the materials into the training system, management of their use, and continuous monitoring of their effectiveness.

Distinguishing Features of the Systems Approach. In these few words, we have attempted to give you an overview of the process. Its distinguishing features are that a systematic analysis is performed in order to determine what should be taught, as opposed to relying on tradition or one person's judgment. After that determination has been made, the Instructional technologist prepares a teaching sequence and strategy based on the latest research in the areas of communication and psychology. Then, after designing and developing the training materials, the instructional technologist must literally "put his money where his mouth is." If the materials do not validate, then they must be revised until they do; this is one of the most rigorous features of the systems approach, viz., performance-oriented instruction. The materials have to be proven to be effective before they can be put into the field.

Interservice Procedures for Instructional Systems Development. As a TEC Manager

INSTRUCTIONAL TECHNOLOGY SYSTEMS APPROACH

- SYSTEMATIC ANALYSIS

- PREPARATION OF INSTRUCTION

- VALIDATION

2-6

you will frequently encounter
the term "ISD." This refers
to TRADOC Pamphlet 350-30,
Interservice Procedures for
Instructional Systems Devel-
opment, more commonly known
as the ISD. The five volumes
of this pamphlet constitute
one of the most complete
textbooks available either
from the Government or
commercially, on the sys-
tematic approach to instruc-
tional development. If it
has any major fault, from
the point of view of the
TEC Manager, it is that it
is too complete. It con-
tains far more detail than
you need to know as a TEC
Manager. You will work
closely with the outputs
of certain phases of ISD,
and will follow some of
the procedures in the de-
sign and development of
TEC lessons. You will not,
however, be involved with
many of the procedures
outlined there. In order
for you to be able to ap-
preciate the completeness
of this model, and to have
a reference to the set of
manuals, we have repro-
duced the overview of the
Five Phases, the Blocks
in each Phase, and the
Outputs of each Phase.

THE BLOCKS IN EACH PHASE ARE:
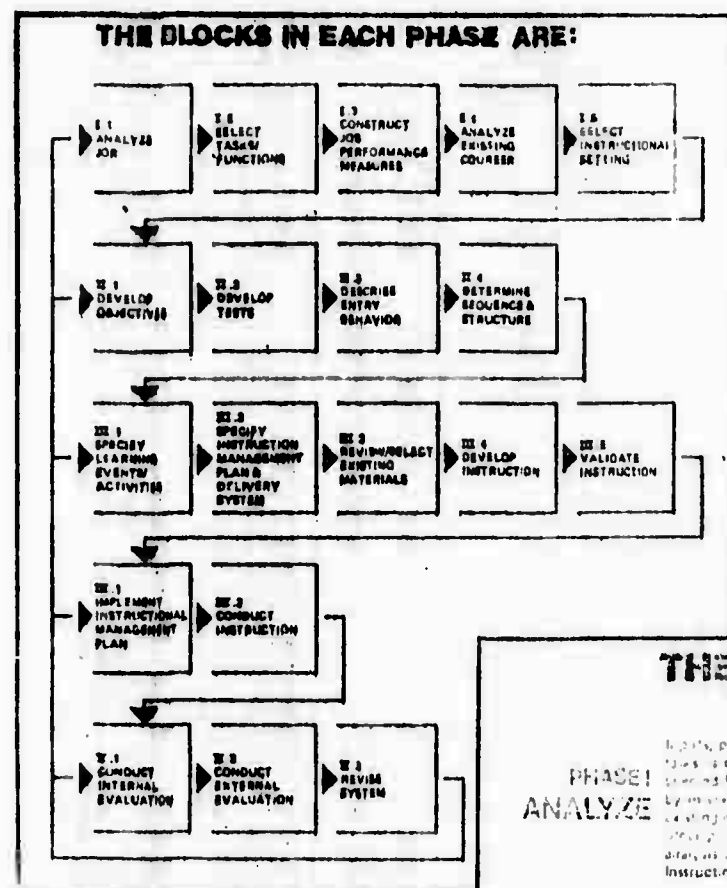
THE FIVE PHASES ARE:

PHASE I
ANALYZE

Inputs, processes, and outputs in Phase I are ... based on job information. An inventory of job tasks is compiled and divided into two groups: tasks ... selected for instruction and tasks ... for instruction. Performance standards for tasks selected for instruction are determined by ... of information ... and verified by ... subject matter experts. The analysis of ... is documented ... in the form of ... descriptions of the analysis phase and ... this task analysis, then done by someone else following the ISD guidelines. As a final ... in this step, the list of tasks selected for instruction is analyzed for the most suitable instructional setting for each task.

PHASE II
DESIGN

Beginning with Phase II, the ISD model is concerned with designing instruction using the job analysis information from Phase I. The first step is the conversion of each task selected for training into a terminal learning objective. Each terminal learning objective is then analyzed to determine learning objectives and learning steps necessary for mastery of the terminal learning objective. Tests are designed to match the learning objectives. A sample of students is tested to insure that their entry behaviors match the level of learning analysis. Finally, a sequence of instruction is designed for the learning objectives.

PHASE III
DEVELOP

The instructional development phase begins with the classification of learning objectives by learning category so as to identify learning guidelines necessary for optimum learning to take place. Determining how instruction is to be packaged and presented to the student is accomplished through a media selection process which takes into account such factors as learning category and guideline, media characteristics, training setting criteria, and costs. Instructional management plans are developed to allocate and manage all resources for conducting instruction. Instructional materials are selected or developed and tried out. When materials have been validated on the basis of empirical data obtained from groups of typical students, the course is ready for implementation.

PHASE IV
IMPLEMENT

Staff training is required for the implementation of the instructional management plan and the instruction. Some key personnel must be trained to be managers in the specified management plan. The instructional staff must be trained to conduct the instruction and collect evaluative data on all of the instructional components. At the completion of each instructional cycle, management staff should be able to use the collected information to improve the instructional system.

PHASE V
CONTROL

Evaluation and revision of instruction are carried out by personnel who preferably are neither the instructional designers nor the managers of the course under study. The first activity (internal evaluation) is the analysis of learner performance in the course to determine instances of deficient or irrelevant instruction. The evaluation team then suggests solutions for the problems. In the external evaluation, personnel assess job task performance on the job to determine the actual performance of course graduates and other job incumbents. All collected data, internal and external, can be used as quality control on instruction and as input to any phase of the systems for revision.

THE OUTCOMES OF THE BLOCKS ARE:

I
.1 ... a list of tasks performed in a particular job.
.2 ... a list of tasks selected for training.
.3 ... a job performance measure for each task selected for instruction.
.4 ... an analysis of the job analysis, task selection, and performance measure construction for any existing instruction to determine if these courses are usable in whole or in part.
.5 ... selection of the instructional setting for task selected for instruction.

II
.1 ... a learning objective for and a learning analysis of each task selected for instruction.
.2 ... test items to measure each learning objective.
.3 ... a test of entry behaviors to see if the original assumptions were correct.
.4 ... the sequencing of all dependant tasks.

III
.1 ... the classification of learning objectives by learning category and the identification of appropriate learning guidelines.
.2 ... the media selections for instructional development and the instructional management plan for conducting the instruction.
.3 ... the analysis of packages of any existing instruction that meets the given learning objectives.
.4 ... the development of instruction for all learning objectives where existing materials are not available.
.5 ... field tested and revised instructional materials.

IV
.1 ... documents containing information on time, space, student and instructional resources, and staff trained to conduct the instruction.
.2 ... a completed cycle of instruction with information needed to improve it for the succeeding cycle.

V
.1 ... data on instructional effectiveness.
.2 ... data on job performance in the field.
.3 ... instructional system revised on basis of empirical data.

Our recommendation is that you read the first volume, Executive Summary and Model, and the third volume, Phase II: Design, in their entirety. The first will give you an overview of the system, and the third volume covers many of the tasks for which you are responsible. You are also responsible for supervising the development process, but we do not see it as essential for you to read all of the fourth volume, Phase III: Develop.

Blocks III.2, III.4, and III.5 are more applicable to TEC than the other two. This volume is very large and contains much information that is not relevant to the TEC development process. It would be more valuable for you to study the development model that is included in any contracts you are working under and to browse through the ISD development phase.

Criterion-Referenced Instruction and the ISD. The expression "criterion-referenced instruction" is commonly used to describe instruction that has competency rather than competitiveness as its goal. In competitive, or norm-referenced, instruction and testing, the goal is to select a given percentage of trainees who come out at the top. A norm-referenced test is designed to rank order people from best to worst. The scores are based on the average score of the people taking the test. In criterion-referenced instruction and testing, a level of proficiency that is appropriate for a given task is defined, and the attempt is made to train everyone until they reach that level. If someone cannot reach the criterion, then that person must be disqualified, or the trainer must seek alternative methods of training the person.

The expression "Criterion-Referenced Instruction" (CRI) has also been used by Robert F. Mager and Peter Pipe in the title of a set of copyrighted materials on the systematic approach to instructional development. Since these materials are copyrighted, and since there are other similar sets of materials for sale by competing publishers, their tables and flowcharts are not included here. However, since these materials are available to many of you as a result of participating in the CRI workshop, it may be useful to see a comparison of CRI with ISD. This comparison illustrates both the diversity and the commonality of the two instructional development models. The major phases are different, but they both include comparable steps.

ISD PHASES	COMPARABLE STEPS	CRI PHASES
ANALYZE	NEEDS ANALYSIS	ANALYSIS
	TASK ANALYSIS	
	SPECIFY OBJECTIVES	
	PREPARE TESTS	
DESIGN	SELECT STRATEGY (OR INSTRUCTIONAL MANAGEMENT PLAN)	DESIGN
	DEVELOP INITIAL VERSION	
DEVELOP	TRY OUT	
	REVISE	
	VALIDATE	IMPLEMENT
IMPLEMENT	IMPLEMENT	
CONTROL	MONITOR, EVALUATE AND REVISE	
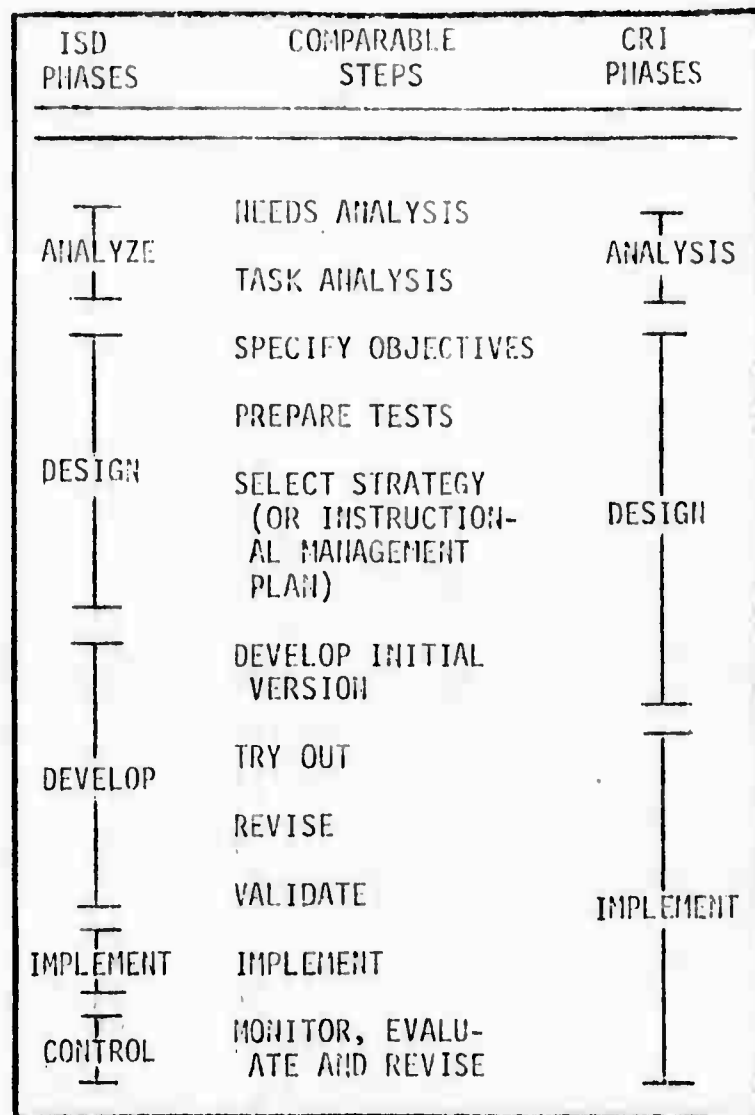
A Final Caution. We must emphasize again that there is no one best model. The ISD, and TEC Contract development models all have one goal: to provide guidance. None of

them can provide prescriptive
rules which will govern all
problems that will occur.
The models can provide gen-
eral principles of systematic
development and some specific
procedures. They cannot cover
every specific instructional
problem that may be encount-
ered. Your understanding of
the basic principles is nec-
essary, and, as in all areas
where judgment is important,
some experience with the pro-
gram will help you fulfill the
goal of high-quality TEC ma-
terials.

Bibliography for 2.1.1

Mager, R. F. & Pipe, P. Criterion-referenced instruction. Palo Alto,
California: Mager Associates, Inc., 1976. (A complete set of
workbooks that describe the design and the development of cri-
terion-referenced instruction.)

TRADOC PAMPHLET 350-30. ISD-Executive Summary. Fort Monroe, Virginia:
U. S. Army Training and Doctrine Command, August 1975. (Provides
overview of ISD model.)

TRADOC PAMPHLET 350-30. ISD Phase II. Fort Monroe, Virginia: U. S.
Army Training and Doctrine Command, August 1975. (Provides in-
formation on the design of instructional material.)

TRADOC PAMPHLET 350-30. ISD Phase III. Fort Monroe, Virginia: U. S.
Army Training and Doctrine Command, August 1975. (Pp. 1-104 tell
how to develop learning activities and how to aid the learning
of these activities. Pp. 105-197 discuss media selection. Pp.
221-279 describe the development of various media. Pp. 280-346
explain how to validate various instructional materials.)

2.1.2 OVERVIEW: How TEC Lessons are Developed and Evaluated

Introduction. The general process of TEC Lesson development and evaluation is given below. It is assumed for convenience here that all the indicated steps (except Reproduction and Distribution) take place within, or are monitored by, the TRADOC School Directorate of Training Developments (DTD), which is further assumed to include the TEC Management Branch. If your School differs from this assumption, translate the words used to fit your organization.

MAJOR STEPS IN THE TEC CYCLE

Job/task analysis

Critical task identification

Formulate training objectives

Select mode of training (TEC or other method)

Prepare training & learning objectives for TEC lessons

FRONT-END PHASE

Criterion referenced test item development

Determine entry level of students

Prepare CCSS and other GFM as required

Develop initial instructional materials

Conduct test on individuals, revise as necessary

DEVELOPMENT PHASE

Small group tests (optional), revise as necessary

Large Group Validation, revise as necessary

Approve final, camera-ready, kits

REPRODUCTION PHASE

Reproduction

Distribution

Front-End Phase. The first major step in TEC lesson development normally will occur independently of a decision to produce TEC lessons. This is the definition of a specific training requirement for soldiers in one of your proponent MOSs. The decision to produce a TEC lesson to meet this requirement depends upon the need to

export the training and the stability of the lesson material. The determination of the training requirement is usually a function of the Task Analysis and Design Division in DTD.

This division is generally responsible for the job analysis necessary to develop job tasks for the Soldier's Manuals. These analyses result in definition of the performance requirements of each critical task. These critical tasks are then translated into training objectives. This is a highly critical step in training development since the validity of these tasks (truthful representation of the real job requirement) and training objectives dictate the maximum extent to which any training material can be effective in training to do the real job.

After critical task performance requirements/training objectives have been defined, these are normally turned over to the Course Development Division or similar organization. This group is then responsible for creating training materials to train to the objectives. It is normally at this point that the decision is made on whether to develop materials through TEC or other instructional means. This decision may well depend on the difficulty of the material, the requirements for exportability, and/or

---

FRONT - END PHASE

- TRAINING REQUIREMENTS

- JOB/TASK ANALYSIS

- CRITICAL TASKS

- TRAINING OBJECTIVES

- TRAINING MODE

- TERMINAL LEARNING OBJECTIVES

- VALIDATION

- STUDENT ENTRY LEVEL

- LESSON LENGTH

- CCSS AND GFM

the judged adaptability of the
training requirement to one or
more of the available TEC media.
If the decision is to go to TEC,
the TEC Management Staff is in
the act for real. Then the sub-
sequent steps given in the TEC
cycle are performed (or moni-
tored) by this group. In case
of contractual lesson develop-
ment, all of these steps are
monitored and evaluated by the
TEC Staff in relation to satis-
fying the requirements for Govern-
ment Furnished Materials (GFM)
and the Coordination and Contract
Summary Sheet (CCSS) which are
to be developed by the TEC Staff
and provided to the contractor.
Development and monitoring of
these materials and activities
are discussed in subsequent sec-
tions. This section will discuss
the steps as they should be con-
ducted, regardless of whether
in-house or by contract.

Given the training objec-
tive (TEC stated in specific
performance-oriented terms),
the Course Developers/TEC staff
begin their part of the front-
end process. This part requires
several essential steps in re-
lation to overall TEC development.

The first step in this
part of the process is to trans-
late the training objectives
into terminal learning objec-
tives for the TEC lesson. These
are specific statements of the
knowledges, skills, and performance
capabilities that the trainee
should process upon completion
of the lesson. To the extent
possible, these learning objec-
tives should be the performance
capabilities and skills necessary
to actually do the soldier's task

TERMINAL LEARNING OBJECTIVES

● SPECIFIC STATEMENTS OF:

- KNOWLEDGES
- SKILLS
- PERFORMANCE CAPABILITIES

● PERFORMANCE REQUIREMENTS

● CONDITIONS

● CRITERIA/STANDARDS

toward which the lesson is
directed. Ideally, these
learning objectives are the
performance requirements,
plus the conditions under
which the performance must
be accomplished, plus the
criterion, or standard, which
the trainee must meet in his
performance after training.
It may be obvious to point
out that the learning objec-
tives may be identical to
the training objectives
which may be identical to
the job task. If the train-
ing objectives fill the bill
for learning objectives, don't
change them. If they are in-
appropriate or incomplete,
change them to meet the need.

As indicated above, the
validity of the training/
learning objectives is highly
critical to the successful
training of the soldier to
perform his job in the field.
Make sure these are correct
and directly related to what
the soldier really must be
able to do.

The development and val-
idation of the criterion ref-
erenced test items is also a
highly critical step in TEC
lesson development and evalu-
ation. The most important
aspect is whether the test
items accurately and reliably
measure what you want to meas-
ure -- and this again is
based on what the soldier
needs to be able to do on the
job. Pre/posttest(s) (there
may be either one or two
equivalent tests) are to be

CRITERION REFERENCED TEST ITEMS

● WHAT YOU WANT TO MEASURE

  - ACCURATELY

  - RELIABLY

● HOW YOU MEASURE

  - PERFORMANCE-ORIENTED TESTS

  - PRETESTS

  - POSTTESTS

developed from the criterion-referenced test items and validated so that they accurately measure the ability of the soldier to perform the tasks he's being trained to do. Ideally, this should be a performance test which requires the soldier to actually perform the required activities. Frequently, it is difficult or impossible to design such a test which can be feasibly administered within the training conditions and time constraints. In such cases "performance-oriented" tests which combine some performance components with some written components may have to be substituted for a "hands-on" performance test. In either case, these tests should be validated through testing both experienced/trained/knowledgeable soldiers (masters) and inexperienced/naive soldiers (non-masters) and determining whether the test really tests the mastery of the tasks to be trained. If the test is valid, it should discriminate between the "Masters" and the "Non-masters." If it does not, two alternatives are possible: either it is not a valid test of the performance task; or, the task is one which does not require training. If the latter is true, you've saved your School some time and effort. If the former is true, you've got more work to do on test development and revalidation of the test. This process is discussed further in Chapter 5 of this manual. Again, this is a highly critical step in TEC lesson development, since if the test is poor, the lesson may be training the wrong skills or not training to the

```
┌─────────────────────────────────────┐
│            VALID TEST:              │
│                                     │
│   MASTERS'      ≠    NON-MASTERS'   │
│   PERFORMANCE        PERFORMANCE    │
└─────────────────────────────────────┘
```

level required to actually
perform the task on the job.
Developing the actual lesson
is an iterative process which
includes much of the Develop-
mental and Reproduction Model
with which you may be already
somewhat familiar. This is
the most time consuming part
of the total development pro-
cess, but from one viewpoint
it is the least critical
step in the process. It is
essentially a systematic
trial and error process which
iteratively evaluates the ef-
fectiveness of the instruc-
tional materials in relation
to the criterion test items
developed in Step 2. Success-
ful performance of this step
will assure that the TEC lesson
teaches to the test. But re-
member, it is the quality of
the test, and of the learning/
training objectives which it
measures, that determine the
effectiveness of the instruc-
tion in relation to the real
world performance of the
soldier on real world tasks.
No matter how good the
instruction is, if it is
training to an inadequate
test, or to meet incorrect
training objectives, it
may be worse than worthless;
it may be dangerous!

The remaining steps
in the front-end phase are:

• Determine the entry level
  of trainees, including
  prerequisite knowledges
  and skills they must bring
  to the lesson.

• Determine the structure
  and format for the lesson,
  including what type of

medium is most appropriate,
how long it must be, whether
more than one kit will be
required, etc.

- Prepare the Coordination and
Contract Summary Sheet (see
Chapter 3) and any additional
GFM that may be necessary.

Development Phase. As
shown in the TEC cycle there are
several general sub steps in the
lesson development phase. These
include:

- Develop the initial instruc-
tional materials for the lesson
these include the script, the
visuals (if audiovisual, printed
text, or job performance aid),
the Lesson Administrative In-
structions (LAI), and the Student
Instruction Sheet (SIS).

- Conduct individual tests of the
lesson instructional materials.
This is the first step in demon-
strating training effectiveness
of the lesson. It yields data
on the quality of the initial
cut at the training materials.

- Revise TEC materials as indicated
by individual trials.

- Conduct optional small group
tests of the lesson materials.
Again, designed to yield diag-
nostic information about the
lesson's effectiveness.

- Revise TEC materials as indicated
by small group trials.

- Conduct validation tests with
large groups (approximately 30
trainees) or with sequential
sampling approach (cf. Chapter 5).

DEVELOPMENT PHASE

- INSTRUCTIONAL MATERIALS

- INDIVIDUAL TESTS

- REVISION

- SMALL GROUP TESTS (OPTIONAL)

- REVISION

- LARGE GROUP VALIDATION

- REVISION

- CAMERA-READY KIT

● Revise TEC materials as
indicated by large group
trials.

Please note that steps
2 through 7 can be recycled,
individually or totally, if
any test results indicate the
need for it.

Once the revised TEC
materials have been demon-
strated to effectively teach
to the criterion level de-
manded based on the importance
of the training objectives
(see Chapter 5), the TEC les-
son is ready to be prepared
in final form.

As the final step in the
development phase, the TEC
Manager's staff is respons-
ible for technical review of
the camera-ready kits.

Reproduction Phase.
Finally, in either in-house
or contractual development,
the kits (in a Master Kit for-
mat) are forwarded for repro-
duction. After reproduction,
copies are forwarded to
Tobyhanna Army Depot for
distribution.

REPRODUCTION PHASE
● REPRODUCTION
● DISTRIBUTION

As we indicated in Section
2.1.1, you are not ordinarily
responsible for the entire de-
velopment process. Most schools
are now organized so that the
TEC program receives the inputs
it needs for the design and de-
velopment of TEC lessons. This
has not always been the case,
and it may still be a problem
in some schools. At this point,
we present an example of the
relationship between the ISD and
the TEC Manager's responsibilities.
Section 2.1.1, an example from
the U.S. Army Transportation
School, illustrates this relation-
ship.

2.2.1   Summary of the ISD Phases
            Related to TEC Development

To help you understand how
ISD and the TEC program are re-
lated, your particular areas of
concern as a TEC Project Officer
are discussed below:

• PHASE I (Analyze) - Task Analy-
  sis at the U.S. Army Transpor-
  tation School is the respons-
  ibility of the Individual
  Training Analysis and Design
  Division, Directorate of Train-
  ing Developments. The outputs
  of Phase I which you will work
  with are a task listing, train-
  ing site selection, and job
  task data cards. The job task

data cards especially will provide a good basis, with the assistance of subject matter experts, for the preparation of learning objectives and test items.

- PHASE II (Design) - In the case of TEC lessons, Phase II functions will be performed by you and your subordinates. Your major outputs for this phase will be learning objectives, self-evaluation criterion-referenced tests, and minimum standards to be used during lesson validation trials. These items are incorporated in a document referred to as the Coordination and Contract Summary Sheet for each TEC lesson. These outputs and the summary sheet are discussed in further detail in other sections of this Project Officer's Guide.

- PHASE III (Develop) - In the case of TEC lessons, the majority of the functions will be performed by a contracted lesson developer, based on School specifications in the Coordination and Contract Summary Sheets and related documents. The contractor's efforts will be monitored by the TEC Branch. The primary output of this phase will be a School-approved, validated TEC lesson prepared for distribution to the field.

- PHASE IV (Implement) - In the case of TEC lessons used in non-resident settings, as most lessons will be, the responsibility for implementation rests in effect

with the trainee's commander or
supervisor. As for TEC lessons
used in a resident setting, the
responsibility for this function
would, of course, rest with the
department having proponency for
instruction in the given MOS.
You will not be involved with
this phase. .

• PHASE V (Control) - Re-
sponsibility for this phase
usually belongs to the Dir-
ectorate of Evaluation (DOE).
You may eventually be con-
cerned with feedback on the
effectiveness and validity
of TEC lessons as a result
of functions performed by
the DOE.

2.2.2 Relationship Between the
ISD and Directorates of
Training Development

Many Directorates of Train-
ing Development have reorganized
or modified their organization
to facilitate a process oriented
training development cycle such
as that described in the ISD.
In most schools, there is a
Training Analysis and Design
Division which is sometimes sub-
divided into two divisions for
individual and collective train-
ing. As the title indicates,
this division covers the first
two phases of the ISD. This
group is responsible for, among
other things, preparing a task
analysis and training objectives.
These will be used by you, and
other groups within the Course
Development Division, during
the development phase, which is

Phase III of the ISD. It
is true, that in some schools,
the TEC Manager does not have
a separate unit within the
Course Development Division,
but this tends to be the ex-
ception rather than the rule.
The fourth phase, Implemen-
tation, is the responsibility
of the various unit commanders
that utilize TEC, but the
fifth phase, Control, is us-
ually the responsibility, at
least in part, of the Direc-
torate of Evaluation.

TYPICAL RELATIONSHIP

BETWEEN DIRECTORATE OF TRAINING

DEVELOPMENT AND ISD

				ISD
DIRECTORATE OF TRAINING DEVELOPMENT				
	DIRECTORATE OF TRAINING ANALYSIS AND DESIGN		ANALYZE DESIGN	
	DIRECTOR OF COURSE DEVELOPMENT		DEVELOPMENT	
	DIRECTORATE OF EVALUATION		CONTROL	
	DIRECTORATE OF TRAINING LITERATURE		ASSISTS INDIRECTLY WITH IMPLEMENTATION	

Planning is an important
aspect of your job.   Without
planning you will not be able
to accomplish your goals, and
ATSC will not be able to antic-
ipate your requirements.   This
section is designed to intro-
duce you to some of your planning
responsibilities.   Your Project
Officer is always willing to
help you with specific questions
or problems.

PLANNING REQUIREMENTS

● SELECTING SUBJECT AREAS

● PLANNING BUDGET

2.3.1   Selecting Subject Areas
        for TEC Lesson Development

During this stage of your
work, you will have to coordinate
with the Training Analysis and
Design Division, and the Course
Design Division.   Your Training
Analysis and Design Division
should have a list of critical
tasks and training objectives
that track with the Soldier's
Manual and SQT tests.   In order
to select the jobs to be developed
in TEC, you will need to use the
criteria that have been approved
by ATSC/TPD.   These criteria tend
to stay the same, although the
order of importance may change in
a given year.   You would use these
criteria in conjunction with the
review and decision procedures
that have been established at
your school.   You should consider

special needs when you are
formulating your TEC require-
ments. Following are the
criteria for TEC subject
area selection:

- Lessons which support EPMS
  training requirements and
  are consistent with the
  EPMS implementation sched-
  ule.

- Lessons which support in-
  creased weapons systems
  effectiveness.

- Lessons which solve valid
  training requirements in
  an on-the-job setting for
  both Active Army and Re-
  serve Components.

- Lessons which replace or
  support existing conven-
  tional training in an in-
  stitutional setting.

SUBJECT AREA CRITERIA

- EPMS

- INCREASED EFFECTIVENESS SUPPORT

- TRAINING REQUIREMENTS

- EXISTING TRAINING

2.3.2 Budget Planning Re-
quirements

From time to time, let-
ters will be sent to you from
ATSC/TPD requesting your school
internal funding requirements
to support the TEC program.
You should be prepared to sub-
mit requests that provide for
the continuance of your current
load, and projections for the
next two fiscal years. Fund-
ing needs should be listed in
the fiscal year during which
they will actually occur.
For example, if a contract
is awarded in April, print

requirements will probably not occur until the following fiscal year. Therefore, funding requests for print support should be requested for the following fiscal year. In the following portions of this section are guidelines concerning ATSC/TPD policies regarding internal funding, a sample of the format to use, a brief description of Element of Expense (EOE) numbers, and an example from the Quartermaster School.

Policies. As a general rule, ATSC/TPD will fund school requests for such items as printing, travel incidental to lesson validation (assume three lessons validated per TDY trip), travel incidental to contractor coordination and/or lesson quality control, shipment of TEC materials, supplies required for ATSC approved in-house TEC lesson development, and miscellaneous materials required to support quality control of TEC lessons at the school. Schools are required to give a brief justification for all expenditures requested.

As a TEC manager, you will be required to submit TEC funding data to your resource management office for inclusion in the installation budget reports to TRADOC. Examples of this would be the Budget Manpower Guidance (BMG), and Budget Execution Review (BER).

The format for school submission of funding requirements will be a letter of transmittal that includes a summary sheet indicating funds requested by Element of Expense (EOE) number. An example of the format for a funding request is given below. As backup material to the summary sheet discussed above, each separate line item within a given EOE for which funds are requested must contain written justification. Example justifications for each EOE are included. For example, if five separate items are requested under the EOE for supplies, each of the five items must be justified. ATSC/TPD cannot approve the expenditure of funds that are not directly related to the TEC program. Questions on funding submissions are to be directed to your ATSC/TPD PO.

FORMAT FOR THE REPORT

(SCHOOL LETTERHEAD)

(OFFICE SYMBOL/LAST NAME AND RANK OF INDIVIDUAL SUBMITTING)   (DATE SUBMITTED)

SUBJECT: FY__ TEC Funding Request

ELEMENT OF EXPENSE	EOE DEFINITION	FUNDS REQUESTED
EOE 2100	Travel and Transportation of People	
EOE 2200	Transportation of Things	
EOE 2300	Rents and Communications	
EOE 2400	Printing and Reproduction	
EOE 2500	Contractual/Purchased Services	
EOE 2600	Supplies and Materials	
EOE 3100	Equipment	
OTHER	All Other Funding Requests	

2-29

Element of Expense (EOE) Definitions

EOE No.	Definition
2100	Includes TDY costs for lesson validation, contractor coordination, attendance at TEC managers conferences and any other travel (civilian or military) that is justifiable.
2200	Expenses anticipated in shipment of GFM to contractors, shipment of art and/or shipment of any other supplies and/or equipment related to TEC that can be fully justified.
2300	Rental of computer terminals, Xerox machines, communications equipment or any other equipment and/or services related to TEC that can be fully justified.
2400	Printing of Lesson Administrative Instruction Job Aids, adjunctive materials, and any other printed matter needed to support TEC lesson production or utilization.
2500	Any contractual services. Generally schools will not have an entry in this line item since ATSC will determine all funding required for actual contracting of TEC lessons. If schools determine some type of additional contracting is needed, it should be entered in this EOE column and fully justified.
2600	Purchase of adjunctive materials such as protractors or any other materials required to support TEC lessons that are not classified as printed matter. Also included in this line item are materials required to support the schools internal TEC staff such as paint materials for in-house produced TEC lessons.
3100	Equipment necessary for production of TEC lessons or quality control. Where regulations require justification of these purchases, the school must indicate whether the required approval to buy the equipment has been secured through proper military channels or what stage the request for approval is in. Additionally, the school must provide written justification concerning why the equipment should be purchased under the TEC program.
Other	If the school feels there is justification for the expenditures of funds that cannot be specifically listed in one of the above EOEs, but is related to the TEC program, the expenditure should be listed in this column and fully justified.

*Example from the Quarter-
Master School.* The following
example includes the letter of
transmittal, and the FY 7T (i.e.,
the continuance of the current
fiscal year) funding request
submitted by the Quartermaster
School in April, 1976.

DEPARTMENT OF THE ARMY
U.S. Army Quartermaster School
Fort Lee, Virginia 23601

15 April 1976

ATSM-TD-CD

SUBJECT: AIS TEC Operating Costs, FY 7T, 77, 78

Commander
U.S. Army Training Support Center
ATTN: ATTSC-TP-PD
Fort Eustis, VA 23604

1. Reference letter, Combat Arms Training Board (ATTNG-TB-PS), dated 30 March 1976,
subject: School Internal Funding Requirements to Support the Training Extension
Course (TEC) Program.

2. Attached at inclosures 1-3 are the QMS projected internal funding requirements
for FY 7T, FY 77 and FY 78 in accordance with the guidelines in reference 1 above.
It should be noted that there are no allowances made for lesson revisions and
reprinting of support materials. In the ever-changing supply arena, this will
continue to increase the workload and internal funding requirements.

FOR THE COMMANDANT:

3 Incl
as

U. S. Army Quartermaster School
Fort Lee, Virginia 23801

ATSM-TD-CD/FISHER, CPT   15 April 1976

SUBJECT: FY 7T TEC Funding Request

ELEMENT OF EXPENSE	EOE DEFINITION	FUNDS REQUESTED
EOE 2100	Travel and Transportation of People	$500
EOE 2200	Transportation of Things	$1550
EOE 2400	Printing and Reproduction	$14,520
EOE 2600	Supplies and Materials	$350
	TOTAL FY 7T REQUEST	$16,920

EXPENDITURE JUSTIFICATION

EOE 2100(TDY) DESTINATION	PURPOSE	NUMBER PEOPLE	LENGTH OF STAY (DAYS)	ESTIMATED COST
San Francisco, CA	Coordinate Lesson Development with Contractor	1	5	$500

EOE 2200 (Transportation of Things)

a. Shipment of Historical Data for 21 TEC lessons, total weight of approximately 25 pounds per lesson with estimated costs of $150.

b. Shipment of Lesson Administrative Instructions, Workbooks, Lesson Books and Learning Resource Books or 5 lessons (551-101-7928 through 551-101-7932), total of approximately 2 million pages as estimated costs of $1400.

EOE 2400 (Printing)

LESSON NUMBER	MATERIAL TO BE PRINTED	ESTIMATED PAGES	ESTIMATED PRINTING COSTS
551-101-7928 through 551-101-7932	LAI, Workbook, Lesson Books, Learning Resource Books	No. of pages and copies per component unknown at this time. Estimated 2 million print units	$14,520

EOE 2600 (Supplies and Materials)

a. Self-Service supplies in support of TEC, estimated cost $250.

b. Packing materials required to ship Historical Data and printed Material to TRAD. Estimated costs of $100.

You may have some knowledge of the content areas for which you are developing, but neither you nor your contractor will have sufficient content knowledge for the development of each lesson. Therefore, you will have to rely on the assistance of subject matter experts (SMEs). Different schools use the SME in different ways, but all schools agree that the primary function of the SME is to check the TEC lesson for technical accuracy. In some cases, the SME is used to check for doctrinal accuracy, or to assist in various aspects of front-end work or lesson development. Regardless of the variety of ways in which the SME is used at your school, the critical task of the SME is to check for the technical accuracy of the TEC lesson.

2.4.1 Utilization of Subject Matter Experts

Schools have found that SMEs and their "chiefs" do not always agree on what constitutes a "technically accurate" lesson. They may have differences of opinion about the procedures, the nomenclature, or the level of detail in the art. Therefore,

2.4 SUBJECT MATTER EXPERTS

You may have some know-
ledge of the content areas for
which you are developing, but
neither you nor your contrac-
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tent knowledge for the devel-
opment of each lesson. There-
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ways in which the SME is used
at your school, the critical
task of the SME is to check
for the technical accuracy
of the TEC lesson.

2.4.1 Utilization of Subject
Matter Experts

Schools have found that
SMEs and their "chiefs" do
not always agree on what con-
stitutes a "technically accur-
ate" lesson. They may have
differences of opinion about
the procedures, the nomen-
clature, or the level of
detail in the art. Therefore,

it is important to determine who
will have approving authority for
the lesson and to include them
early to eliminate subsequent
changes based on their biases.

This tendency to have dif-
ferent opinions about what a
"technically accurate" lesson is
causes problems when you have
turnover in SMEs. It is best if
you can have the same SME work
with a given lesson until it is
finished. Since you may not al-
ways be able to do this, you may
have to face the task of breaking-
in a new SME on a lesson that is
already under development. One
way of helping to remove per-
sonal bias from the SME's de-
cision, is to discuss the dif-
ferences between "technical
acceptability" and "personal
style." Most experts, unless
they are extremely closed-minded,
will recognize that there is more
than one way to get a job done,
even though they like their way
best. By encouraging the new
SME to make this distinction,
you might be able to save yourself
some revision time and money.
The new SME might get a chance to
show-off his style in a subsequent
lesson.

2.4.2 Limitations of the SME

While a good SME can be in-
valuable, it is also important to
realize that SMEs have inherent
limitations. Quite a number of
years ago, job analysts discovered
what they called the "master work-
er fallacy." It was traditional
to define a job by analyzing the

work of a master worker. Some-
one finally pointed out that
even a master worker may not
be doing a job as efficiently
or effectively as it could be
done. Even this person is
limited by his own personal
experience and biases. The
same principle holds true
with SMEs. They, like the
rest of us, tend to over-
generalize from personal
experience, and to keep doing
something the same way it
has worked once. Therefore,
it might be appropriate in
some situations to obtain
input from more than one SME
on a given lesson. You will
discover how dramatically
different the responses of
several SMEs to a given in-
structional task can be.
It would then become the
task of yourself, one of your
project officers, or one of
your SMEs to help untangle
purely stylistic differences
from substantive differences
in the responses of the dif-
ferent SMEs.

This section contains descriptions of the recurring reports that are required of you. Whenever possible, a reduced-sized copy of the form is included to assist in recognition. If you need instructions or an example of a completed copy of any of these forms, please contact your ATSC/TPD PO.

2.5.1 DAVIS Reports: DD Form 1995

Purpose. The DD Form 1995 is used to program information into the Defense Audiovisual Information System (DAVIS). DAVIS can help to guard against duplication of effort by several schools. Duplication is a common problem due to the overlapping of TEC lesson material among schools. All programmed lessons for production in various formats, TV, TEC, etc. will be listed in the computer files so schools are aware of productions underway in a given subject area.

Required By. The following require the filing of DAVIS reports:

- AR 108-2, 1 September 1976.

- Letter, ATTSC-TP-TEC, U. S. Army Training Support Center, 22 September 1976, subject: Completion of DD Form 1995 for the Defense Audiovisual Information System.

• Letter, ATTSC-TP-TEC,
7 December 1976, subject:
Input to the Defense Audio-
visual Information System.

<table>
<tr><td colspan="8">FY
TEC PRODUCT REQUIREMENT, RCS ATTNG-55
(QUARTERLY)</td></tr>
</table>

SCHOOL: _____   FY ___ QTR _____

FY   DELIVERY SCHEDULE

1ST QTR	2ND QTR	3RD QTR	4TH QTR	*H	CA	IH	TOTAL

STATUS	TEC LESSON NUMBERS REACHING STATUS 1-2-3
(1) Kits approved for mass-reproduction. (AV-AD-PT)	
(2) Kits reaching repro approval but returned for corrections.	
(3) Kits approved for answer print or equivalent as in AD or PT.	

* IN-HOUSE LESSONS/IN-HOUSE LESSON WITH CONTRACT ART.

REMARKS:

2.5.2 Quarterly TEC Product Requirement, RCS ATTNG-55

Purpose. At the beginning of FY 77, Installation Commanders signed "Installation Contracts" with the Command Group, Headquarters, TRADOC. The contracts outlined specific numbers of products to be completed during FY 77. The TEC Program was included as a major area of interest. Total TEC Products to be delivered were listed and then subdivided into quarterly delivery schedules.

Required By. Letter TRADOC, 1 March 1977, subject: Quarterly TEC Product Requirements, RCS ATTNG-55.

2.5.3 TEC Direct Obligations*

Purpose. These reports are absolutely necessary in order to facilitate the continued funding of school support for the management/administration of the TEC Program. This point was driven home at the May, 1977 TEC Managers Conference. ATSC/TPD needs to be able to claim unobligated funds in order to use them where they are

* Only non-TRADOC schools are required to report TEC Direct Obligations.

needed before they are
lost at the end of a fis-
cal year. Should you lose
any funds due to their being
recalled by ATSC/TPD, they
will be replaced when needed
in the next budget cycle.
Only with your cooperation
can TEC funds be most effec-
tively utilized. There is
no particular format, ex-
cept to report by Element
of Expense (EOE).

Required By. The fol-
lowing references should be
consulted for TEC Direct Ob-
ligations reports:

- Reference paragraph 7,
  Memorandum for Record,
  TEC Manager's Conference,
  19-22 October, 1976; and
  letter, TRADOC, 30 De-
  cember 1976: subject:
  TEC Direct Obligations
  FY 77.

- Budget Manpower Guidance
  (BMG) narrative.

2.5.4 TEC Lesson Status Report

Purpose. This report is used to track the events that take place throughout the development cycle of all TEC lessons being developed by the school/contractor.

Required By. An agreement made with all schools at the April 1974 TEC Conference. The provisions of the agreement were used to establish the Status Report for TEC III, IV, and V Schools. Each contract uses a form that, although similar, is different in its details.

LESSON STATUS REPORT - AN EXAMPLE

2.5.5 Lesson Review/
Approval Reports

Purpose. These reports are used by the school to provide the developing and reproduction contractor(s) with the school's evaluation of kits at various stages of development. These reports either approve the contractor's work or identify deficiencies that must be corrected before the school authorizes the contractor to proceed to the next stage of development.

Required By. During the November 1974 TEC Manager's Conference, the schools were provided with the basic format for lesson review correspondence.

SAMPLE - REVIEW COMMENT

SCHOOL HEADING.

OFFICE SYMBOL   DATE

SUBJECT, Review of Semi-Comprehensive Storyboards (Event 9) for TEC kit
          #947-071-0164-7, Arming and Disarming the M21 Anti-Tank Mine

CONTRACTOR

1. School has reviewed the storyboards, subject as above, received on
17 November 1977.

2. Comprehensive comments and changes are attached as Inclosure 1, and
have been annotated on the storyboards.

3. General comments.

4. Additional comments.

5. Proceed with Event 10   (Instructions to contractor).

1 Incl   SIGNATURE BLOCK

COMMENTS/CHANGES - TEC Kit #949-771-0164-F
Arming and Disarming the M21 Anti-Tank Mine

Legend:

A   Error comment concerning art.
AS   Audio/script corrections or comments
P   Error attributable to C.A. Marshall, Inc.
U   Error attributable to USATS
X   Error responsibility cannot be accurately determined.
C   Corrections annotated on original storyboards, correct before next event.
F   Corrections made in final production.

Frame #	Error Code	Error Attrib to	Code	Description
2	A	P	C	Add "7" to TEC Lesson Number
8	AS	X	C	Delete reference to "eleven" mines in the series. Posted to storyboard.
5 & 6	A/AS	P	C	The visuals and audio for these frames do not agree. Frame 5 shows the soldier ready to fuze an already emplaced mine. Frame 6 then tells the student to emplace the mine which was already accomplished at some unknown point between frames 4 and 5. Recommend that Frame 5 tell the student to emplace the mine and that the visual show the soldier putting the mine in a prepared hole. Frame 6 should use the current Frame 5 and should tell the student to fuze the mine.
5 & 6	A	P	F	Uniform color is incorrect. See GFM.
7	A	P	C	Mine body is out of proportion in relationship to the fuze,...the mine body is too large. Also, the soldier's uniform is not the proper color.
8	A	P	F	Uniform color is incorrect. See GFM.
9	A	P	F	Uniform color is incorrect. See GFM.
11	A	P	C	Closure assembly is out of proportion in relationship to the fuze.
14	A	P	C	Tracks of the enemy tank are too close together. Art need only show one track.
15	A	P	F	Uniform color is incorrect. See GFM.
19	A	P	C	Closure assembly is out of proportion to fuze size.
23	A	P	F	Uniform color is incorrect. See GFM.
25	A	P	F	Closure assembly is out of proportion to the fuze size.

2.5.6 TEC Lesson Annual
Review Reports

Purpose. These reports are
used to notify the Training Support
Center of the results of annual re-
views and request/recommend actions
to update, revise or recall fielded
lessons.

Required By. USATSC Letter:
Letter of Instruction for Conduc-
ting Annual Review of TEC Lessons,
2 May 1977; requests that you re-
view TEC kits yearly.

SAMPLE FORMAT

SCHOOL HEADING

OFFICE SYMBOL

SUBJECT: Annual Review of TEC Kit 000-000-0000-F

US Army Training Support Center
ATTN: ATTSC-TP-TEC
Fort Eustis, VA 23604

1. (Indicate date kit was reviewed and by whom.)

2. (Indicate result of review, Extensive changes may be listed at
Inclosure. Changes should be listed frame by frame.)

3. (Include recommendation on method of revision, if necessary.)

SIGNED

2.5.7 Composite Task List
Update Reports

Purpose. The Composite Task List is a reference document that identifies every task taught in fielded TEC lessons. In addition, the Composite Task List indicates tasks that are being addressed in lessons currently being developed by schools and tasks that schools plan to include in TEC lessons that they will develop in the future. The Composite Task List enables course designers to determine if TEC lessons can be used to support course objectives in addition to providing training material developers a document that can be used to determine if TEC lessons should be referenced in products such as the Soldier's Manual. The Composite Task List also assists schools in avoiding duplicating tasks in their TEC lessons that are or will be covered by another school.

With these reports, you should report changes to the basic Composite Task List. There is no particular format that you have to follow.

Required By. Letter, USACATB, 8 March 1976, subject: Composite Task List; requires you to report changes when they occur.

CHAPTER 3

PREPARATION FOR TEC
LESSON DEVELOPMENT

CONTENTS

3.0 PREPARATION FOR TEC LESSON DEVELOPMENT

PREPARATION FOR LESSON DEVELOPMENT

● KNOW INSTRUCTIONAL THEORY

● CARRY OUT SPECIFIC PRO-CEDURES OF TEC PROCESS

The TEC development system gives you a proven method of effective lesson development. This chapter summarizes what you have to learn in order to do your job as a TEC manager. Along with this guidebook you will need TRADOC Pamphlet 350-30 Inter-service Procedures for Instructional Systems Design (especially important is the Executive Summary) and the TEC contract model under which you will be working.

A new TEC officer will quickly find that he must make a number of decisions on TEC lesson development. He must know some instructional theory (a set of basic principles) and carry out specific procedures required of the TEC process. The purpose of this chapter is to:

● Provide a brief overview of the basic principles as applied in TEC lesson development.

● Describe and furnish examples of techniques and procedures used by TEC managers and developers in lesson development.

3.1 OVERVIEW OF THE BASIC PRINCIPLES

The purpose of this overview is to fill the immediate need of newly assigned TEC Officers. It covers the concepts of performance-oriented training as applied to TEC. Since these principles drive TEC development preparation, a summary of "TEC logic" should give you a feel for the thinking behind TEC lesson development. For a full description of the development process, you should refer to the latest contractual flow diagram/event description and the ISD model (see Chapter 2).

When the focus is on preparation for development, everything comes from the principle of performance-oriented training. The TEC manager should understand the critical relationships of task analysis, audience characteristics, and criterion-referenced testing to training objectives. These are the concepts and procedures that allow TEC to rise above the traditional methods of instruction. They are the reasons why performance-oriented instruction makes sense.

3-3
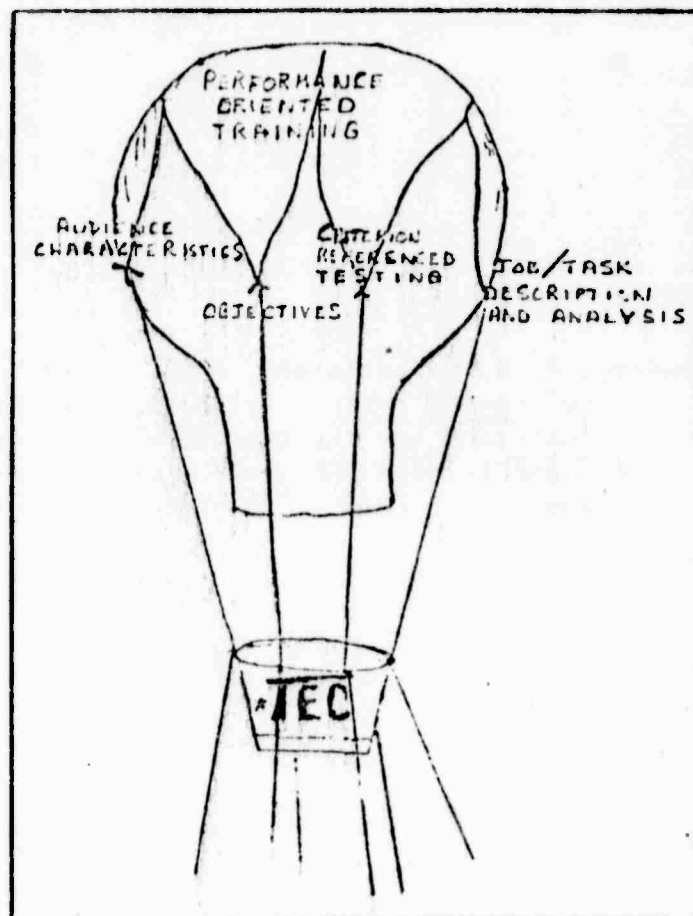
3.1.1 Performance-Oriented Training

The goal of every TEC lesson is that upon completion of the lesson the soldier has a skill that he can perform. Traditional instruction analyzed the content of instruction. Performance training looks at what the soldier must do. The emphasis is shifted away from knowledge and toward performance. The soldier must perform or TEC fails!

Through TEC the training materials themselves do the teaching. More accurately, lessons are designed to help the soldier teach himself. Both the learning characteristic of the soldier and the task that make up the job (the MOS duty position) are purposely built into the TEC lesson. These elements focus on final soldier performance. What that performance is and how it is to be measured are stated in the training objectives and their criterion-referenced tests.
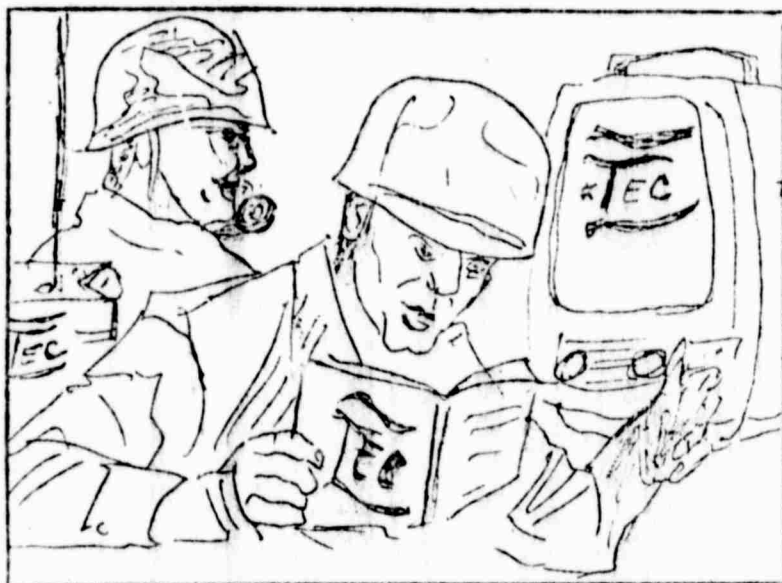
Bibliography for 3.1.1

Swezey, R. W. & Pearlstein, R. B. Guidebook for developing criterion-referenced tests. Arlington, Virginia: U. S. Army Research Institute for the Behavioral and Social Sciences, August 1975. (AD A014 987) (Chapter 1 discusses criterion-referenced testing and how it relates to performance measurement.)

3.1.2 Job/Task Analysis vs Training Task Analysis

In Chapter 2 you were introduced to job/task analysis. This section briefly covers task analysis from the point of view of training task analysis. The job/task analysis is the primary input into training task analysis.

A job/task analysis is a logical description of the duties, tasks, and elements that make up an MOS duty position. The logical breakdown of these tasks is not necessarily the way the soldier will most effectively learn to perform the tasks. Training task analysis takes the tasks selected for training and structures them in ways that help the soldier master the performance of those tasks. Often, however, the job/task analysis and the training task analysis approximate each other so closely that the two are interchangeable. Experienced developers generally use the term "task analysis" to refer to both. They assume the context of the conversation makes it clear as to whether he is referring to job analysis or training task analysis.

Occassionally you may need to clarify the point of reference in a discussion: "Now, are we talking about task analysis with respect to the job or to the training objectives?" The differences between the two are given below.

JOB/TASK ANALYSIS

JOB

Duty   Duty

TASK   TASK   TASK   TASK

E - L - E - M - E - N - T - S

TASKS selected for exportable training

Job Performance Measures (JPM) of the selected TASKS

JOB Duties and Tasks performed by one worker.

DUTY Major subdivision/grouping of closely related tasks/basis for determining assignment, qualifications, and post-assignment training.

TASK Analysis level for the job/specific action/definite beginning and end/performance/measureable/independent of other actions.

ELEMENT Smallest meaningful unit of behavior/dependent upon other actions/always components of a procedure.

TERMINAL TRAINING OBJECTIVE

TRAINING TASK ANALYSIS

Learning Objective   Learning Objective

Step   Step   Step   Step

TERMINAL TRAINING OBJECTIVE Performance-oriented/specific description of an action a learner is to exhibit after training/states the conditions under which the action will take place/states the standards or criterion that must be reached/directly related to job performance.

LEARNING OBJECTIVE Component of a Terminal Training Objective/further divisible into steps/same characteristics as Terminal Training Objectives -- actions, conditions, standards.

LEARNING STEP Description of all components necessary to learn to perform the Learning Objective.

TEC

Bibliography for 3.1.2

Department of the Air Force. Handbook for designers of instructional systems: Task analysis (Vol. II, AFP 50-58). Washington, D. C.: Headquarters, United States Air Force, July 1973. (Provides a complete description of task analysis.)

Tracey, W. R., Flynn, E. B., & Legere, C. L. J. The development of instructional systems: Procedures manual. Fort Devens, Mass.: United States Army Security Agency, 1970. (Contains a section on task analysis.)

TRADOC PAMPHLET 350-30. ISD Phase I. Fort Monroe, Virginia: U. S. Army Training and Doctrine Command, August 1975. (Pp. 1-112 discuss task analysis.)

TEC lessons are intended for
very specific audiences: soldier/
trainees. These audiences are the
target population of the TEC lesson.
Since the target population is go-
ing to function as a learner, the
lesson must be geared to the in-
structionally relevant learning
characteristics of the typical
soldier/trainee for whom the train-
ing is intended. This chapter pre-
sents general audience consider-
ations while Chapter 4 (See Section
4.1.3) gives you sepcific methods
for determining the target aud-
ience parameters of the lesson
material. The Army has found
that age, rank, MOS, educational
background, and months in service
are useful descriptors of the
target population. There is a
growing body of educational re-
search on how learner and task
characteristics influence one
another. Instructional develop-
ers find it helpful to list
audience characteristics in a
number of categories. The most
often researched categories
relevant to training are
given below.

```
┌─────────────────────────────────────────────────────────────────┐
│                          CATEGORIES                             │
│                                                                 │
│   PHYSICAL              APTITUDES               SKILLS          │
│                                                                 │
│   • AGE                 • IQ                    • JOB-RELATED    │
│   • SEX                 • VERBAL                  SKILLS        │
│   • HANDICAPS             ABILITY               • EXPERIENCE    │
│       OR                • SPATIAL                              │
│     STRENGTHS             ABILITY                              │
│   • DEXTERITY                                                  │
│                                                                 │
│                                                                 │
│   KNOWLEDGE             SOCIAL                  ATTITUDES       │
│                                                                 │
│   • EDUCATIONAL         • WORK ENVIRON-         • MOTIVATION    │
│     LEVEL                 MENT                  • INTEREST      │
│   • READING             • PEER REFERENCE        • BIASES AND    │
│     LEVEL                 GROUP                    PREJUDICES   │
│   • MATHEMATICAL        • SOCIOECONOMIC         • ANXIETY       │
│     BACKGROUND            STATUS                   LEVEL        │
└─────────────────────────────────────────────────────────────────┘
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The research is fine, but
in the real world of TEC devel-
opment large files of psycho-
metric data on attitudes and
abilities for individual MOSs
is not available (and never will
be). There is another way to
effectively define and limit
the target population -- course
prerequisites.

Course prerequisites help
you ensure that you do not try
to train those who are not ready
for the TEC lesson. You do not
want soldiers taking TEC lessons
that go far beyond their present
knowledge or skill. The soldier
must have acquired the prerequisite
skills through other TEC lessons,
courses, or OJT to be able to
master the new material.

Course prerequisites, as all
training development requirements,
come from a performance perspective.
What must the soldier be able to
do before he can optimally learn
from the new lesson. In this
way the course prerequisites force
the attention of the TEC manager
and developer on entry performance.
They also take into consideration
the broader perspectives on how
the TEC lessons fit together
and into the total training and
management system.

Course prerequisites as de-
veloped for the Lessons Adminis-
trative Instructions (LAIs) are
covered in Chapter 6. The aud-
ience characteristic will be
listed on the title page of the
CCSS to aid the developing con-
tractor laying out the Kit Design
Approach (KDA). The target aud-
ience characteristics will influence

the developer's decisions
on the amount of material
to be covered, the medium,
the level of language to be
used, the learning strategy,
and the starting point of
the lesson. You should
supply the ranges for:

- Formal education

- Months of military service

- Grade/rank

- Primary sources of military
  training

- Prior training or experience
  with lesson subject matter

    - MOS training (school based)
    - OJT
    - TEC lessons prerequisites.

In section   3.3, the CCSS
title page reflects a useful
set of audience descriptions
for lesson development. It
describes who the trainee is
with respect to the training
task.

3.1.4 Training Objectives

For TEC, the Front-End Phase
(see Chapter 2) should now pro-
duce a compact and instructionally
relevant statement -- the TRAINING
OBJECTIVE. The training objective
is a clear and explicit performance
statement built on three elements:
(a) the task; (b) the conditions;
(c) the training standard. Look
at the following example given
below.

DEFINITION	EXAMPLE

TASK:

- THE TASK TO BE PERFORMED IS IDENTIFIED IN OBSERVABLE TERMS. APPLYING A BATTLE DRESSING IS OBSERVABLE. WE CAN SEE THE SOLDIER DO IT.

- EACH SOLDIER WILL APPLY AN INDIVIDUAL BATTLE DRESSING.

CONDITIONS:

- THE CONDITIONS ARE STATED UNDER WHICH THE SKILL OR KNOWLEDGE IS DEMONSTRATED. IT TELLS THE TRAINER WHAT RESOURCES AND MATERIALS MUST BE PROVIDED FOR THE SOLDIER/TRAINEE.

- GIVEN AN INDIVIDUAL BATTLE DRESSING, A SUBJECT INDIVIDUAL (OR PRACTICE DUMMY), AND A NARRATIVE DESCRIPTION OF WOUND LOCATION.

TRAINING STANDARD:

- THE TRAINING STANDARD STATES THE MINIMUM STANDARD OF ACCEPTABLE PERFORMANCE THE STUDENT MUST ATTAIN TO PASS THE TEST (PERFORM ACCEPTABLY).

- DRESSING MUST BE APPLIED WITHIN 2 MINUTES.

- DRESSING MUST BE APPLIED WITHOUT TOUCHING (CONTAMINATING) STERILE SIDE OF DRESSING.

- DRESSING MUST COVER DESCRIBED WOUND.

- THE CRITERIA ESTABLISHED BY THE TRAINING STANDARD ARE USUALLY:

    - TIME
    - COMPLETENESS
    - ACCURACY
    - SAFETY STANDARDS (IF REQUIRED).

- STUDENT MUST APPLY PRESSURE TO THE WOUND EITHER WITH THE ATTACHED BANDAGES OR WITH THE HAND OVER THE DRESSING, UNTIL IT IS DETERMINED BY THE TRAINER THAT BLEEDING HAS STOPPED.

- THESE CRITERIA ARE FOUND IN THE JPM (JOB PERFORMANCE MEASURES) OF THE TASKS AS PART OF THE WORK OF THE TASK ANALYSIS DIVISION.

- THE BANDAGES MUST BE WRAPPED AROUND THE DRESSING AND THE WOUNDED LIMB AND TIED SECURELY OVER THE DRESSING.

Because the performance in the training objective is explicit, there is less debate about what the objective means. Because the objective describes the performance with action verbs, rather than "mental" verbs, such as knows, understands, is proficient in, there is a great deal of common agreement about what is and what is not acceptable performance.

PERFORMANCE-ORIENTED TRAINING
OBJECTIVES

- CLEARLY STATED

- RESOURCES EMPLOYED EFFICIENTLY

- OBSERVABLE, EXPLICIT STATEMENT
  OF PERFORMANCE

- SOLDIER/TRAINEE ORIENTED

- CONTROL THE INTENT OF INSTRUCTION

- REQUIRE ACTION VERBS

- MOST STUDENTS UNDERSTAND WHAT IS
  EXPECTED OF THEM BY SIMPLY READ-
  ING THE TRAINING OBJECTIVES

- "MEASURABLE" TERMS FOR PERFORMANCE

Bibliography for 3.1.4

Gagne, R. M. The conditions of learning (2nd ed.). New York: Holt, Rinehart, and Winston, Inc., 1970. (A general text on the learning process.)

Gagne, R. M. & Briggs, L. J. Principles of instructional design. New York: Holt, Rinehart, and Winston, Inc., 1974. (Provides general information on the development of training objectives.)

Mager, R. F. Preparing instructional objectives. Belmont, California: Fearon Publishers, 1962. (Contains procedures for developing objectives for instructional material.)

TRADOC PAMPHLET 350-30. ISD Phase II. Fort Monroe, Virginia: U. S. Army Training and Doctrine Command, August 1975. (Pp. 2-34 provides information on the development of training objectives.)

Criterion-referenced tests
of the training objectives test
the objectives--nothing more.
They are measures of whether or
not the soldier performs at the
level required of the objectives.
Criterion-referenced tests are
related to the Job Performance
Measures (JPMs), but they are
prepared in much greater detail.
Criterion-referenced tests tell
the soldier exactly what he is
to do and the conditions under
which he is to do it. Although
the primary purpose of the cri-
terion-referenced test is a
GO-NO GO decision on soldier
performance, the test must also
have a diagnostic capability.
That is, the test must yield
information about why the soldier
failed to pass the test. Con-
sequently, some items on the
test may be purely diagnostic
ones, testing subordinate skills
or functioning as indicators of
"trouble spots" in some of the
intermediate objectives.

Another major feature of
criterion-referenced tests is test
revision. Criterion-referenced
testing usually requires several
run-throughs before inconsistencies,
confusing points, and performance
difficulties can be eliminated.
This technical problem is handled
by the test developers, while the
TEC manager's responsibility is
to ensure completeness, fidelity,
and realistic cut-off scores that
correspond to the overall training
plan.

CRITERION-REFERENCED TESTING

- REQUIRES A TASK ANALYSIS

- INDICATES WHO CAN PERFORM
  A TASK TO ACCEPTABLE STANDARDS

- PROVIDES DIAGNOSTIC INFORMATION

Bibliography for 3.1.5

Mager, R. F. & Pipe, P. Criterion-referenced instruction. Palo Alto,
    California: Mager Associates, Inc., 1976. (A complete set of
    workbooks that describe the design and the development of criterion-
    referenced instruction.)

Swezey, R. W. and Pearlstein, R. B. Guidebook for developing criterion-
    referenced tests. Arlington, Virginia: U. S. Army Research Institute
    for the Behavioral and Social Sciences, August 1975. (AD - A014 487)
    (Pp. 1-1 to 1-12 provide an introduction to criterion-referenced
    testing.)

TRADOC PAMPHLET 350-30. ISD Phase II. Fort Monroe, Virginia: U. S.
    Army Training and Doctrine Command, August 1975. (Pp. 36-61 discuss
    the development of tests for measuring job performance.)

In Chapter 2 the procedures were covered for planning the TEC program. After subject matter has been determined and approved, it is time to put together the GFM.

3.2.1 How to Develop Government Furnished Materials (GFM)

The GFM consists of the Coordination and Contract Summary Sheet (CCSS) and all relevant equipment and materials needed to produce the lesson. GFM is not a hastily thrown together package of previous training materials and field manuals. The TEC manager and developer should view the GFM as representing four critical dimensions:

● GFM is a reflection of serious training needs best served by exportable training and determined through prior needs analysis.

● GFM embodies the principles of performance-oriented instruction, the training philosophy of the U.S. Army.

● GFM together with the current contract model of TEC development defines the conditions and constraints for management

decisions that guide the
lesson development process.

- GFM, especially the CCSS,
is essentially the basis
from which the developing
contractor will commence
work.

Incomplete CCSS and other
GFM will create a "fuzzy" be-
ginning for you and the de-
veloping contractor. It is
your job to see that the CCSS
is as specific and detailed
as possible. All references
should document page, para-
graph, and figure numbers
(when applicable). Contrac-
tors, often unfamiliar with
the content of the TEC lesson
when first starting, can waste
hours going through a large,
detailed manual looking for
a particular item of infor-
mation that has been refer-
enced by document number
only. Throughout the pro-
ject you will be living
with the CCSS. The CCSS
will be guiding the devel-
opment of the TEC lesson.

A conscientious TEC
manager and developer and
a fully competent contrac-
tor can and will solve
many problems together.
Theirs can be a stimu-
lating and professionally
rewarding relationship.
Each brings his own per-
spective and expertise
to the project. Neither
sloughs his duties and
responsibilities off on
the other. A new TEC
manager may overly rely

```
┌─────────────────────────┐
│        CAUTION!         │
│                         │
│ DO NOT PUT OFF PROBLEMS  │
│ WITH EXPECTATION THAT    │
│ THE CONTRACTOR CAN OR    │
│ WILL SOLVE THEM FOR YOU. │
└─────────────────────────┘
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PERFORMANCE
ORIENTED
TRAINING

AUDIENCE
CHARACTERISTICS
CRITERION
REFERENCED
TESTING

OBJECTIVES
JOB/TASK
DESCRIPTION
AND ANALYSIS

TEC

PREFERENCES
AND
EQUIPMENT

MEDIA
SELECTION

TRAINING
OBJECTIVES

CCSS

CRITERION
TEST
ITEM
POOL

LAIs
SIS

GOVERNMENT FURNISHED
MATERIALS

on the advice and recommen-
dations of a contractor. He
may feel unsure of his own
"educational expertise."
That's natural. However, if
you are uncertain about the
consequences of heavily re-
lying on a contractor, ask
an experienced TEC manager.
He has often learned the hard
way. The contractor's point
of view is not always in line
with the best interest of
TEC.

Many of these problems
can be avoided with a clear
and precise CCSS. Developing
the GFM is the real-world
substance of TEC development.
It anchors TEC to the Army's
instructional setting. The
following sections of this
chapter provide you with the
techniques and procedures
that help ensure a well-con-
structed CCSS and GFM package.

3.2.2 Lesson Scope and Purpose
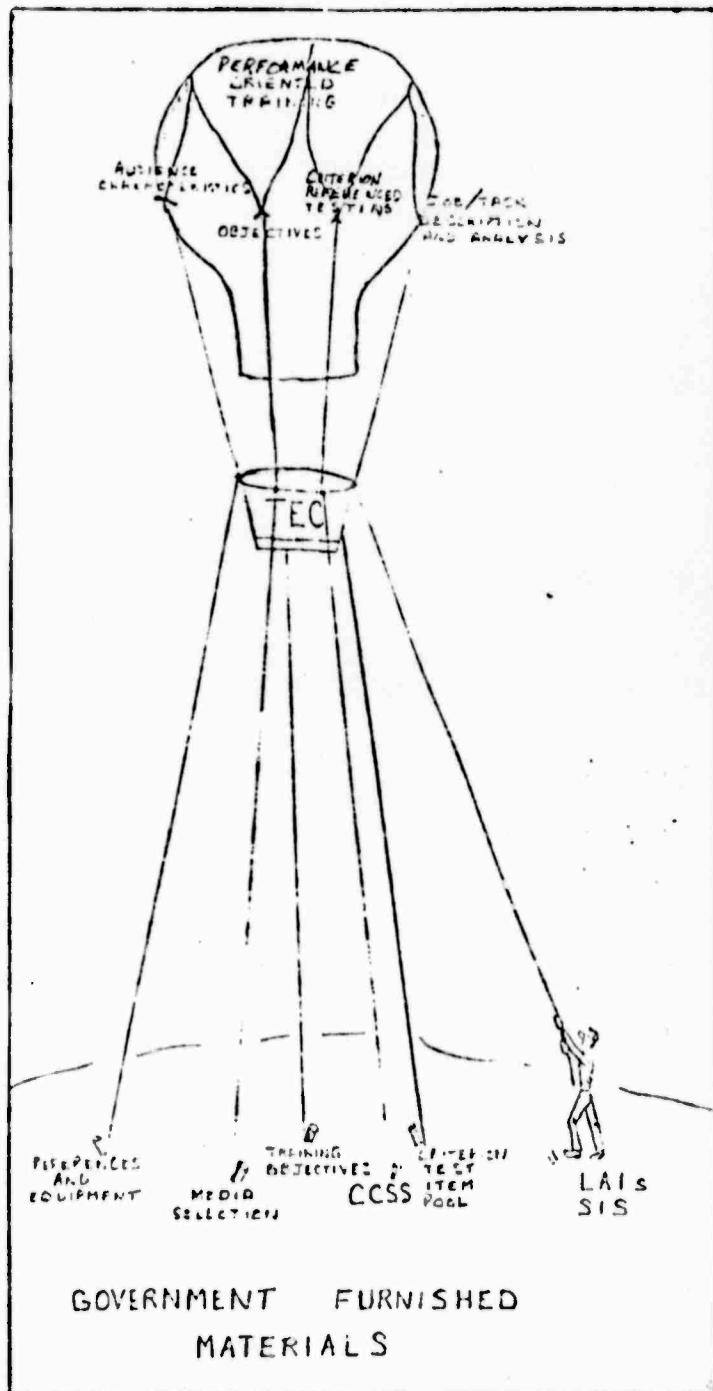
The goal of every TEC lesson is to produce a task performer. Goal statements are statements of how you intend to rectify a discrepancy. That is, you distinguish between the way it is now and the way it ought to be. Define goals in terms of what is and what ought to be. The "what is" becomes the input of the TEC lesson, the "what ought to be" is the sought for output.

DEFINING LESSON GOALS - AN EXAMPLE

"WHAT IS"	"WHAT OUGHT TO BE"
INPUT	OUTPUT
Soldiers in MOS62B at Skill Level 2 perform below the minimum proficiency on the job at the following tasks:	Performance levels required of MOS62B Skill Level 2 personnel are that they are able to maintain the following standard for the following tasks:

1._____
2._____
3._____

1._____
2._____
3._____

By laying out the broad goal of the TEC lesson you can easily define the Scope/Purpose of the lesson--a requirement of the CCSS. In the Scope/Purpose statement you tell the developer who the target audience is and what skills he should be expected to learn. The Scope/Purpose statement is not as specific as the training objectives, rather it tells the developer in a general way what the lesson is intended to do.

The learning steps taken to reach the terminal training objectives is an often debated problem. Although many roads lead to Rome, there will be arguments about which is the best road. For many tasks, the number and order of learning steps offer several good possibilities.

Sequencing the learning steps within each training objective implies a rationale for the realtionship among the events of learning in a TEC lesson. The decision tree is a quick, logical way to determine sequencing priorities.

DECISION TREE FOR SEQUENCING OBJECTIVES

Question:
Is the relationship DEPENDENT?

(Does the learning of one require previous mastery of the other?)

DEPENDENT? — yes → LOGICAL sequencing is mandatory

no

Question:
Is the relationship SUPPORTIVE?

(Does the learning of one facilitate the learning of another? Example: driving a car aids in learning to drive a truck.)

SUPPORTIVE? — yes → TRANSFER sequencing

no

(more difficult to provide evidence for; try to document with previous lessons, research findings, jury of experts, etc.)

INDEPENDENT relationship

You have many possibilities in sequencing independent relationships: chronological (performance) ordering, novelty sequencing, motivational, simple-complex, etc. Experience and trial-and-error are the usual methods.

Bibliography for 3.2.3

TRADOC PAMPHLET 350-30. ISD Phase II. Fort Monroe, Virginia: U. S. Army Training and Doctrine Command, August 1975. (Pp. 79-96 provide detailed information on the sequencing of training objectives.)

Tasks selected for train-
ing come from the MOS task list-
ing. These tasks along with
their Job Performance Measures
(JPM) are transformed into
training objectives. The criterion-
referenced tests of the training
objectives would ideally be
the same as the JPMs. JPMs
are, however, often imprac-
tical as the TEC criterion-
referenced tests (CRTs) be-
cause of time, resources,
and equipment. Besides, you
cannot expect the soldier
after initial training to
perform at a proficiency
level that must be gained
through practice.

Normally, you must at-
tempt to construct a post-
test that approximates the
JPM. Two problems arise
with criterion-referenced tests
of training objectives: the
training conditions and
training standards. Train-
ing conditions differ from
real-world conditions by
the very nature of the
training setting. You should
try to make these conditions
match as closely as possible
the conditions the soldier
will find on the job. The
conditions statement in the
test must tell the soldier
under what conditions he
must perform the task.

The standards for post-
tests are generally lower
than the standards of the
JPMs. When first learning
to perform a task, the trainee

3-19

have a lower degree of proficiency, and to produce a less than perfect product.

As you turn the training objectives into test items, you will find there is no magic formula for determining how detailed the tests should be, what standards should be set, and how the test is to be scored. Test development is much like TEC lesson development. Experience, consensus, trial-and-error are primary ingredients. This does not mean that decisions on test construction should be arbitrary. A valuable procedure to follow in developing CRTs has been produced by Swezey and Pearlstein for the Army Research Institute. This practical, applied procedure significantly improves the quality of criterion-referenced tests. The flow of this process is given below.

• ASSESS THE OBJECTIVES AS INPUTS INTO THE CRT	- PERFORMANCE - CONDITIONS - STANDARDS
• DEVELOP A TEST PLAN	- PRACTICAL CONSTRAINTS - ITEM FORMAT - NUMBER OF ITEMS
• CONSTRUCT THE ITEM POOL	- MATCHING WITH THE OBJECTIVE - CLEAR AND UNAMBIGUOUS - EASY TO ADMINISTER - APPROPRIATE LEVEL OF REALISM
• SELECT FINAL TEST ITEMS	- (SEE CHAPTER 5)
• ADMINISTERING AND SCORING THE TEST	- (SEE CHAPTER 5)
• MEASURING RELIABILITY AND VALIDITY	- (SEE CHAPTER 5)

the state-of-the-art of criterion-referenced test development, refer to the ISD (Phase II Design), the CRI Workshop materials, and Swezey and Pearlstein.

The pretest (see Chapter 5) is essentially a bypass of instruction for the soldier who passes it. This test determines whether the soldier can already adequately perform the training task or some sections of the whole lesson. It is a waste of time to train someone to do what he already knows how to do.

The pretest is designed to test precisely what the posttest tests. According to the ISD, the pretest is generally identical to the posttest or an alternative version of that test. The ISD (Phase II Design), covers both pre- and posttesting in the section on entry behavior.

Bibliography for 3.2.4

Mager, R. F. & Pipe, P. Criterion-referenced instruction. Palo Alto, California: Mager Associates, Inc., 1976. (A complete set of workbooks that describe the design and the development of criterion-referenced instruction.)

Swezey, R. W. and Pearlstein, R. B. Guidebook for developing criterion-referenced tests. Arlington, Virginia: U. S. Army Research Institute for the Behavioral and Social Sciences, August 1975. (AD - A014 487) (This 210 page guidebook outlines the rationale for the CRT approach and provides specific guidance for the construction of test items.)

TRADOC PAMPHLET 350-30. ISD Phase II. Fort Monroe, Virginia: U. S. Army Training and Doctrine Command, August 1975. (Pp. 36-61 provide information for test development. Pp. 62-78 discuss both pre- and posttesting.)

When developing the GFM,
you should consider:

- time and cost of developing
  new materials

- the purpose of the objectives

- the requirements of the con-
  tractor for detailed technical
  information

- the references (documentation)
  in the CCSS.

Time and Cost. Do not re-
invent the wheel. Use what you
have, when you can. Many train-
ing materials already in existence
are successful. Inspect for their
ability to meet TEC needs. Check
the TEC lesson composite task
listing and the TEC monthly status
report to ensure you are not du-
plicating what is being done or
has been done.

Purpose of the Objectives.
When gathering training materials,
focus on the performance of the
training objectives. When you
review materials, ask yourself how
the information relates to the
training objective. If the infor-
mation is a technical document, is
it up-to-date? Is it correct?
If the materials are previous
training packages or plans of instruc-
tion, are the content and method of
presentation applicable to the TEC
lesson? Is it capable of being

3-22

ment must be judged on its availability, cost, ease of transportation, and indestructability. Students can be very hard on equipment.

Requirements of the Contractor. Contractors generally request complete documentation and technical assistance. The GFM must reflect your best effort to supply all relevant materials. Otherwise, you will constantly hear the phrase, "Well, we don't have the . . ."

References (Documentation) in the CCSS. A sample of a checklist and reference sheet is provided below that you may wish to use to keep track of reference sources that you have located. During the development process a document or piece of equipment that was originally deemed irrelevant may be critical at a later date. This work sheet for logging sources considered for the GFM can be extremely helpful in retrieving discarded materials.

WHEN YOU REFERENCE MANUALS AND DOCUMENTS, CITE PAGES, PARAGRAPH NUMBERS, FIGURES, ETC. BE SPECIFIC. NAIL IT DOWN SO THAT THE CONTRACTOR DOESN'T SPEND EXCESSIVE AMOUNTS OF TIME SEARCHING FOR THE INFORMATION.

TEC Lesson _____

Training Objective _____

Document/Equipment Title and Number	Technical Reference	Instructional Materials	Equipment	Where Obtained	How related to the Objective	Selected for GFM (yes/no)	Comments

3-24

Once you have established
the exact materials to be issued
to the development contractor,
it becomes necessary to prepare
a GFM receipt which lists those
materials issued to the con-
tractor. To accomplish this
schools will complete ATSC
Form 122, dated 1 Nov 77,
Loaned Government Owned
Property Receipt. Special
note must be made of the "Must
Return" and "Expendable" Col-
umns. For each item of GFM
or GFE (Government Furnished
Equipment) you must indicate
whether the material is to
be returned to the school.
The receipt must be signed
and dated by a contractor
representative and copies
retained by the school and
contractor. Copies of ATSC
Form 122 have been distri-
buted by ATECP; however,
schools may reproduce this
form locally after initial
supply has been exhausted.

3-25

AUDIENCE
CHARACTER-
ISTICS

TASK
ANALYSIS

TRAINING
OBJECTIVES

CRITERION
REFERENCED
TESTING

LAI

SIS

GFM

CCSS

TEC Performance

The CCSS is a critical document in your work with your contractor. The quality and cost of the final product will depend, to a great extent, on the quality of the CCSS. The purpose of this section is to introduce you to the purpose, format, and content of the CCSS.

3.3.1 The CCSS as an Instructional Guide and Contract

The CCSS is part of the GFM supplied to the contractor by the TEC Project Officer. As you develop the CCSS the critical importance of all of the front-end analysis will become obvious. The arduous, time-consuming, and meticulous process of defining the audience, working with the task analysis, developing specific training objectives, and compiling criterion referenced test items starts to pay off. It is this work which forms the content of the CCSS.

3.3.2 Writing the CCSS

In form, the CCSS has a title page and one or more pages explicitly stating the training objectives, the criterion referenced

test, the responses the soldier
will make, and a remarks sec-
tion. A description and ex-
planation, as well as an
example of the CCSS, are
given below.

SUBJECT AREA TITLE: This is a working title. Each kit
                       will eventually receive its own title.

                       The scope provides a brief summary
SCOPE: of the purpose of the lesson.

                       Information you acquired during the
TARGET AUDIENCE: earlier analysis of training needs is
                       supplied here. Factors found to be
                       critical in Army training programs
                       have been: level of education, months
                       of military service, and rank. Any
                       data on the personal charateristics
                       of the target group can be helpful
                       in deriving instructional strategies,
                       particularly with respect to moti-
                       vational strategies.

                       This is where you can suggest the
MEDIA AND METHOD OF TRAINING: medium that you feel would be the
                       most appropriate for the kit.

                       In this section you list and refer-
                       ence all materials and equipment the
GOVERNMENT FURNISHED   contractor receives (ARs, FMs, TMs,
MATERIALS: video tapes, etc.).

                       Identify the name, rank, and tele-
                       phone number of the technical ad-
TECHNICAL ADVISOR AND/OR visor and/or subject matter expert.
SUBJECT MATTER EXPERT:

                       This is a statement of the minimum
                       standard of achievement of partici-
                       pants during group validation required
MINIMUM STANDARD: for approvals of a kit. The minimum
                       standard of 90/80 would state that
                       90% of the participants in the group
                       validation must respond correctly to
                       80% of the posttest items before final
                       approval is given. This ratio of re-
                       quired percentage of participants cor-
                       rectly responding to required percentage
                       of posttest items is linked with the
                       criticality of the IEC lesson.

                       Detailed explanation of training objectives,
                       self-evaluation criterion, response and
LESSON SPECIFICATION SHEET: criteria, and specific remarks.

LESSON ... ION AND CONTRACT SUMMARY SHEET

1. Lesson Title: ... te Radio Set AN/GRC-106(), Part 2
                           201-113-4507F
2. Lesson Number:

3. Purpose and Scope: The purpose of this lesson is to provide the soldier with the skills and knowledges to perform the
                           preliminary starting procedure and starting procedure on the Radio Set AN/GRC-106.

4. Target Audience: The soldier receiving these instructions must have received Operate Radio Set AN/GRC-106(1, Part I;
                           will have 11 to 13 years of formal education; 6 to 24 months of military service; attained the grade
                           of E-2, E-3 or E-4; primary source of military training will be AIT and/or on-the-job training; length
                           in current duty position or MOS prior to receiving this training is not applicable. Soldier must not
                           have had any training as an operator of Radio Teletypewriter Sets AN/VSC-2, AN/GRC-122, or AN/GRC-142.

5. Media and Method of Training: This lesson is intended as a demonstration practical exercise presentation in audio visual format. Audio
                           visual will provide the motor skills necessary to perform the preliminary starting procedure and starting
                           procedure on the Radio Set AN/GRC-106.

6. Government Furnished Material: a. TM 11-5820-520-12, dated February 1971 titled OPERATOR AND ORGANIZATION MAINTENANCE MANUAL RADIO
                           SETS AN/GRC-106 AND AN/GRC-106A.

                           b. Lesson Plan coded 201-05820/C06-LP2, dated 10 Dec 72, titled INTRODUCTION TO RADIO SET AN/GRC-106.

7. Project Officer: MAJ George Hodgson, AUTOVON 780-3526/4895

8. Technical Advisor: SFC Charles King, AUTOVON 780-1297/3014

9. Subject Matter Expert: Mr Dennis Trudeau, AUTOVON 780-1297/3014

10. Minimum Standard: Criticality B

11. Lesson Specification Sheet: Inclosure

12. Response and Criteria: Criterion for each response is GO; NO-GO

<table>
<tr><td>List the specific training objectives that will be measured by the criterion-referenced test items at the completion of the kit.

Each training objective will identify the TASK, the CONDITIONS, and the TRAINING STANDARD.</td><td>List the criterion-referenced test items that measure each training objective.

These criterion-referenced test items will form the post-test administered after the completion of each kit.</td><td>List the actions a soldier must take to perform the task.

These actions or responses will comprise the subtasks required to meet the training objective.</td><td>List any pertinent remarks or comments such as: FM references, warnings, critical evaluation points, etc.

This section helps the contractor better understand the focus and needs of the lesson objectives.</td></tr>
</table>

COORDINATION AND CONTRACT SUMMARY SHEET (LESSON SPECIFICATION SHEET)			LESSON IDENTIFICATION: Operate Radio Set AN/GRC-106(), Task 2
TRAINING OBJECTIVES	SELF-EVALUATION CRITERION	RESPONSE AND CRITERIA	REMARKS
1. Perform the preliminary starting procedure on the Receiver-Transmitter RT-662/GRC or RT-834/GRC.			NOTE: If radio set is bench mounted (lab) turn primary power source on at this time. If vehicle mounted, start engine. Audio will explain the CAUTION remark as outlined in TM 11-5820-520-12, para 3-4. CAUTION: To avoid damage to components in the AN/GRC-106(*) when the system is installed in a vehicle, always make sure the AN/GRC-106(*) is turned off when starting the vehicle engine.
a. SERVICE SELECTOR switch.	Learner places the SERVICE SELECTOR switch on the receiver transmitter to the OVEN ON position.	Learner identifies the SERVICE SELECTOR switch on the receiver transmitter and places the switch to the OVEN ON position.	Panel/Visual will identify the SERVICE SELECTOR switch on the Receiver-Transmitter RT-662/GRC or RT-834/GRC and show the switch in the OVEN ON position. Audio will explain the purpose of why the switch must first be placed in the OVEN ON position and the reason it must be left in that position for a period of 10 minutes (for initial warmup....)
b. VOX switch.	Learner places the VOX switch to the PUSH to TALK position.	Learner identifies the VOX switch on the receiver-transmitter and places the switch to the PUSH to TALK position.	Panel/Visual will identify the VOX switch on the Receiver-Transmitter RT-662/GRC or RT-834/GRC and shows the switch in the PUSH to TALK position. Audio will explain the function of the VOX switch in all positions as outlined in the TM 11-5820-520-12, para 3-7....
c. SQUELCH switch.	Learner places the SQUELCH switch to the OFF position.	Learner identifies the SQUELCH switch on the Receiver-Transmitter RT-662/GRC or RT-834/GRC and places the switch in the OFF position.	Panel/Visual will identify the SQUELCH switch on the Receiver-Transmitter RT-662/GRC or RT-834/GRC and will show the switch in the OFF position. Audio will explain the action of the SQUELCH switch both in the OFF position and ON position as outlined in TM 11-5820-520-12, para 3-2 and 3-7, NOTE 1....
d. NOISE BLANKER (older models).	Learner places the NOISE BLANKER switch to the OFF position.	Learner identifies the NOISE BLANKER switch on the receiver-transmitter and places the switch to the OFF position. (Some models of RT-662 ONLY)	Panel/Visual will identify the NOISE BLANKER switch on the Receiver-Transmitter RT-662/GRC and show the control to be in the OFF position. Audio will explain that all receiver-transmitters with serial number 221 and above, no longer have the switch...

FISESS FORM 21
1 Mar 74

(overlapping forms, partially obscured)

FISESS FORM 21
1 Mar 74

Perform the preliminary starting procedure on the Amplifier AM-3349/GRC-106.

a. HV RESET switch.

Learner places the HV RESET switch to OPERATE.

Learner identifies the HV RESET switch on the Amplifier AM-3349/GRC-106 and places the switch to the OPERATE position.

FISESS FORM 21
1 Mar 74

FISESS FORM 21
1 Mar 74

3-29

DESIGN AND ASSESSMENT
OF TEC LESSONS

CONTENTS

CONTENTS (continued)

This chapter provides human factors and design information you need to monitor and evaluate the production of TEC lessons. Since TEC can be developed either in-house or by a contractor, these criteria can be followed in the in-house production cycle or used in monitoring and evaluating the contractor's development effort. Criteria for lesson design are discussed and methods for application of these in lesson assessment are presented.

The chapter consists of three major parts. Section 4.1 presents design criteria for the development of all or several TEC lesson types. These criteria comprise media selection, lesson considerations, self-evaluation design, and pictorial level of detail. Sections 4.2 thru 4.5 present special considerations related to the development of lessons in various media. Finally, Section 4.6 discusses how to use these criteria and considerations in the assessment of TEC lessons, whether developed in-house or by a contractor. It provides checklists which can be used to assess the strengths and weaknesses of individual lessons. This assessment technique should be used as a diagnostic tool to improve subsequent drafts of lesson materials.

Because of the uniqueness of each TRADOC School, this chapter presents only the major considerations of how these criteria should be incorporated into your development process. Appropriate references and cross-references are provided where possible.

CONTRACTOR DEVELOPED TEC LESSON   IN-HOUSE DEVELOPED TEC LESSON
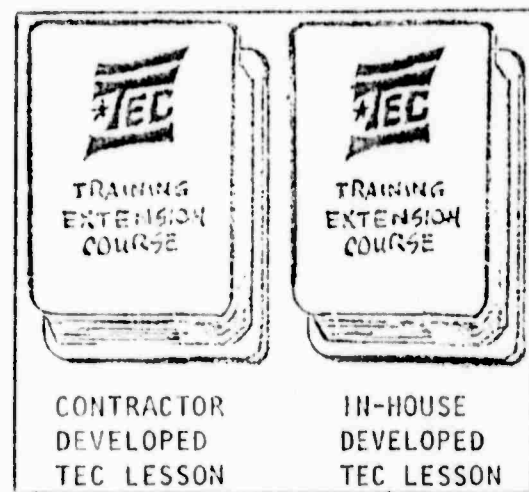
TEC LESSON DESIGN CRITERIA

- GENERAL

- LESSON FORMAT SPECIFIC

  - AUDIOVISUAL
  - AUDIO ONLY
  - PRINTED TEXT
  - JOB PERFORMANCE AID

- ASSESSMENT

4-3

Additional TEC lesson development
requirements can be found in the
existing TEC contracts. The materials
in this chapter are not intended to
modify or negate any requirement of
the existing contracts, but, they can
help you in monitoring and assessing
the products of the contracts.

4-4

As a TEC manager you are required
to actively participate in TEC lesson
development and to monitor the contrac-
tor's performance for contracted develop-
ments.   The criteria presented in this
and the following sections are intended
to assist you in that development and
monitoring process.   This chapter should
help you understand how the available
design criteria can be applied in de-
velopment and assessment of TEC lessons.

Before discussion of specific
criteria and their applications, you
should understand that the conscientious
application of all the design criteria
in the world cannot assure the develop-
ment of training effective TEC lessons.
Training effectiveness is a function of
several things, only one of which is the
technical aspect of lesson design.
There are also the factors of having a
valid measurement instrument (test),
and having valid and meaningful instruc-
tional materials for the training
sequence.

On the other hand, without appli-
cation of the best technical approaches
to lesson development, without considera-
tion of the relationships between audio
and visual modes of instruction, and
without consideration of the needs of
your audience, the best application of
the other factors may also be worthless.
This can happen because the intended
audience cannot understand the lesson,
or because they are bored with it, or
because they just will not sit and en-
dure an overly lengthy lesson, or be-
cause of any number of similar reasons.

POOR DESIGN	=	INEFFECTIVE TEC LESSON

In summary, a particular TEC kit or lesson can fail to train effectively due to either poor design or inadequate instructional techniques. The elimination of the poor design from the start can give your instructional technology its best chance to train effectively.

4.1.1 TEC Lesson Media Selection

A major decision in the TEC development process is deciding which medium to choose for lesson presentation. Presently, the media available for TEC lessons are audio-visual (AV), audio only (AO), and printed text (PT). Future TEC lesson formats may also include videodisc, computer assisted instruction (CAI), or any number of new delivery systems.

When discussing media selection, the new TEC manager should keep in mind there are two types of TEC lessons: teaching lessons and guidance lessons. Teaching lessons are formatted in one of the three aforementioned media and are designed for initial or refresher instruction so that soldiers can learn to perform particular tasks. Guidance lessons, called Job Performance Aids (JPAs), use a checklist or "talk-through" format to assist the soldier in performance of a given task or procedure. Presently, the only TEC medium for JPAs is printed text (See Section 4.5).

4-6
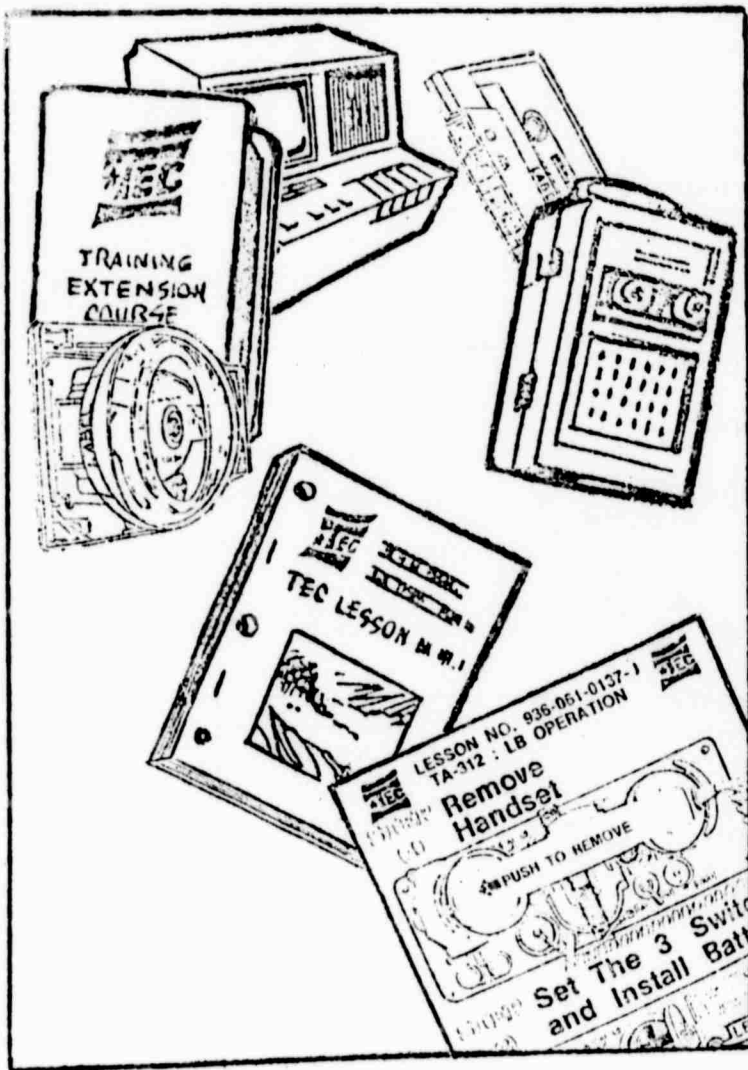
available, the major decision on media selection concerns the mode of information presentation, i.e., should information be presented primarily auditorily (AO) or visually (AV,PT)? In particular, does the material require visual support? Can it be easily presented in writing only? Or, is an auditory mode sufficient to communicate the information? Factors, such as those following, should be considered in your choice.

USE AUDITORY MEDIUM IF:	USE VISUAL MEDIUM IF:
• THE INFORMATION IS SIMPLE.	• THE INFORMATION IS COMPLEX.
• THE INFORMATION IS SHORT.	• THE INFORMATION IS LONG.
• THERE IS NO NEED TO CROSS-REFERENCE THE INFORMATION.	• THERE IS A NEED TO CROSS-REFERENCE THE INFORMATION.
• THE INFORMATION DEALS WITH EVENTS IN TIME.	• THE INFORMATION DEALS WITH LOCATION IN SPACE.
• THE INFORMATION REQUIRES IMMEDIATE ACTION.	• THE INFORMATION DOES NOT REQUIRE IMMEDIATE ACTION.
• THE RECEIVING LOCATION IS TOO BRIGHT FOR AV PRESENTATION OR TOO DARK TO PERMIT READING OF PRINTED MATERIAL.	• THE RECEIVING LOCATION IS TOO NOISY.
• THE INDIVIDUAL IS REQUIRED TO MOVE ABOUT CONTINUALLY.	• THE INDIVIDUAL CAN REMAIN IN ONE POSITION.
• THE TASK REQUIRES A "HANDS-ON" ACTIVITY THAT CAN BE EASILY DESCRIBED WITHOUT VISUAL IDENTIFICATION.	• THE TASK REQUIRES VISUAL INPUT (e.g., LOCATING SWITCHES).
	• THE TASK REQUIRES A "HANDS-ON" ACTIVITY WHICH MUCT BE DEMONSTRATED OR ILLUSTRATED.

medium, however, you should identify the media alternatives that would be suitable to effectively teach the TEC lesson objectives. This process provides you with a set of candidate delivery systems that excludes all the inappropriate systems. Using the table below will provide some guidance in making a trade-off decision.

CHARACTERISTICS	RELATIVE RANKING		
	HIGH	MEDIUM	LOW
Flexibility in Lesson Design	PT	AV	AO
Student Access	PT	AO	AV
Mobility (Field Use)	PT	AO	AV
Ease in Updating/Revisions	PT	AO	AV
Student Interest/Motivation	AV	AO	PT
Inadequate Reading Skills	AV	AO	PT
Requires Visual Movement Presentation	AV	PT	AO
Presentation of Pychomotor Preceptual Skills	AV	PT	AO
Cost	AV	AO	PT

A more complete and systematic method for determining the most appropriate delivery system is given in ISD (Block III.2, pp. 106-124).

4-8

is a judgmental decision process based
on practicality and cost alternatives
Several factors, like those discussed
below have to be considered when re-
jecting media formats.

FACTORS THAT SHOULD BE CONSIDERED IN REJECTING MEDIA ARE:

- STATE-OF-THE-ART: THE BASIC MEDIUM IS UNDER DEVELOPMENT OR TEST
  AND MAY NOT BE INCLUDED FOR THE TEC PROGRAM.

- INTERFACE WITH EXISTING PROGRAM: TEC LESSONS MUST BE DESIGNED
  TO FIT INTO EXISTING PROGRAMS, WHICH PLACES CONSTRAINTS ON THE
  NEW LESSONS: e.g., EQUIPMENT ON HAND, AVAILABLE CLASSROOMS,
  SCHEDULING PRACTICES, ETC.

- TIME TO PRODUCE MEDIA: MEDIA WHICH REQUIRE LONG LEAD TIMES FOR
  DEVELOPMENT MAY NOT BE USEFUL WHEN SCHEDULED READY-FOR-TRAINING
  DATES DO NOT ALLOW A LONG DEVELOPMENT CYCLE.

- BUDGET CYCLE CONSTRAINTS: WHILE THE APPLICATION OF SOME OF THE
  POWERFUL TRAINING APPROACHES, SUCH AS CLOSED CIRCUIT TELEVISION,
  MAY RESULT IN LOW COSTS PER STUDENT GRADUATE, THE INITIAL IN-
  VESTMENT IS SUBSTANTIAL. UNLESS THESE RESOURCES APPEAR IN
  EXISTING BUDGETS, THE APPLICATION OF THESE TECHNIQUES TO AN
  IMMEDIATE PROBLEM IS NOT FEASIBLE.

- ADOPTION OF INNOVATIONS: PROJECT TEAM MEMBERS FREQUENTLY RE-
  SIST INNOVATIONS. IF THE PROPOSED MEDIUM IS SIGNIFICANTLY DIF-
  FERENT FROM EXISTING TECHNIQUES, EITHER ADEQUATE RESOURCES
  MUST BE FOCUSED UPON GAINING ACCEPTANCE FOR THE INNOVATION, OR
  A MORE TRADITIONAL APPROACH MUST BE SELECTED.

- COURSEWARE DEVELOPMENT: IF THE COURSEWARE IS TO BE LOCALLY
  DEVELOPED, SKILLED PERSONNEL, EQUIPMENT, TIME, AND DOLLARS MUST
  BE AVAILABLE.

- HIGH COST ALTERNATIVES: THE PROJECTED LIFE CYCLE COST OF A
  MEDIUM APPROACH MAY BE SIGNIFICANTLY HIGHER THAN OTHER EQUALLY
  USEFUL ALTERNATIVES.

- LEARNING STYLE OF TRAINEES: IF TRAINEE HAS LOW READING ABILITY
  OR WOULD BE LIMITED IN HIS ABILITY TO USE CERTAIN KINDS OF MEDIA,
  THEN REJECT THESE MEDIA AS INAPPROPRIATE.

- OTHER CONSTRAINTS: A VARIETY OF OTHER PRACTICAL FACTORS SHOULD
  BE CONSIDERED: e.g., COMMAND POLICY AND EXISTING INVESTMENT IN
  PRODUCTION FACILITIES.

selection algorithm that is useful for selecting TEC lesson presentation media. The algorithm was developed by the U. S. Navy, but the specific procedures for applying it to TEC, was developed by Captain John T. Buono at ATSC-TPD ATECP. The complete process is given below.

MEDIA SELECTION

Instructions.

1. Once a task has been selected for training, it is necessary to select a medium for presentation. In making a medium selection, it is important to remember that media does not teach, content teaches. The purpose of media selection is to attempt to find the medium that is most instructionally effective and cost effective.

2. The charts and tables provide a simplified method of determining which medium to select, to train a particular task. To begin, have the "Media Selection Questions" sheet and the "Media Selection Algorithm" sheet side-by-side. Read all of the steps before beginning.

- Step 1 - Select a task to be trained.

- Step 2 - Answer question 1 on the "Media Selection Questions" sheet.

- Step 3 - From the response of question 1, follow the "Media Selection Algorithm" and answer the appropriate questions in the Algorithm, until a media choice is identified. A media choice will be an "M" numbered block.

- Step 4 - Refer to the "Media Selection Choices" and the "Description of Representative Media Types" sheets.

- Step 5 - Once you have identified the media choices you must select the medium to be used. To select this medium, consider the following:

    a. Consider the choices in descending order.

    b. The lower the reading level, the more pictorial representation is needed.

4-10

c. Availability of presentation hardware.

d. Relative cost of the medium choice for both development and reproduction.

3. Following these 5 steps you will have a simplified method of selecting which media should be used for instructions. Remember that no medium can teach; a medium is only as good as its contents.

4. The following definition of terms should be of assistance in using the Algorithm:

a. Familiarization (behavior level) - student is expected to gain a general knowledge of tasks. Usually will be associated with introductory type lessons.

b. Discriminated Recall - given a set of previously learned or presented tasks, the student will be able to correctly choose that task necessary to perform a specific skill.

c. Rule-using - student will use a set of rules in performing a skill.

d. Familiarization (content level) - a general knowledge of tasks, specific skills are not intended to be taught at this level. Familiarization level content is generally associated with managerial knowledge of skills.

e. Review - previously acquired tasks which need to be refreshed as either prerequisite to new skills or to reinforce the previously learned tasks.

f. Concept - a logical progression of abstract ideas that directly relate to a sequence of tasks. Note concept level content is very difficult to develop in measurable terms. If concept level content is identified, great care should be used in the writing of objectives.

g. Rule - a logical sequence of procedures or guides to the accomplishment of a skill.

What is the level of behavior expected of the student for this task?

1. Familiarization
2. Discriminated recall
3. Rule-using

Question 2:

What level of content is being taught?

1. Familiarization
2. Review
3. Concept
4. Rule

Is the number of examples the student needs to see small or large?

1. Small
2. Large

Question 4:

What is the minimum display requirement?

1. Simple pictoral
2. Complex pictoral
3. Motion required
4. Interactive (Student must interact with an instructor)

Question 5:

Is the memorization component of this objective large or small?

1. Small
2. Large

MEDIA SELECTION ALGORITHM
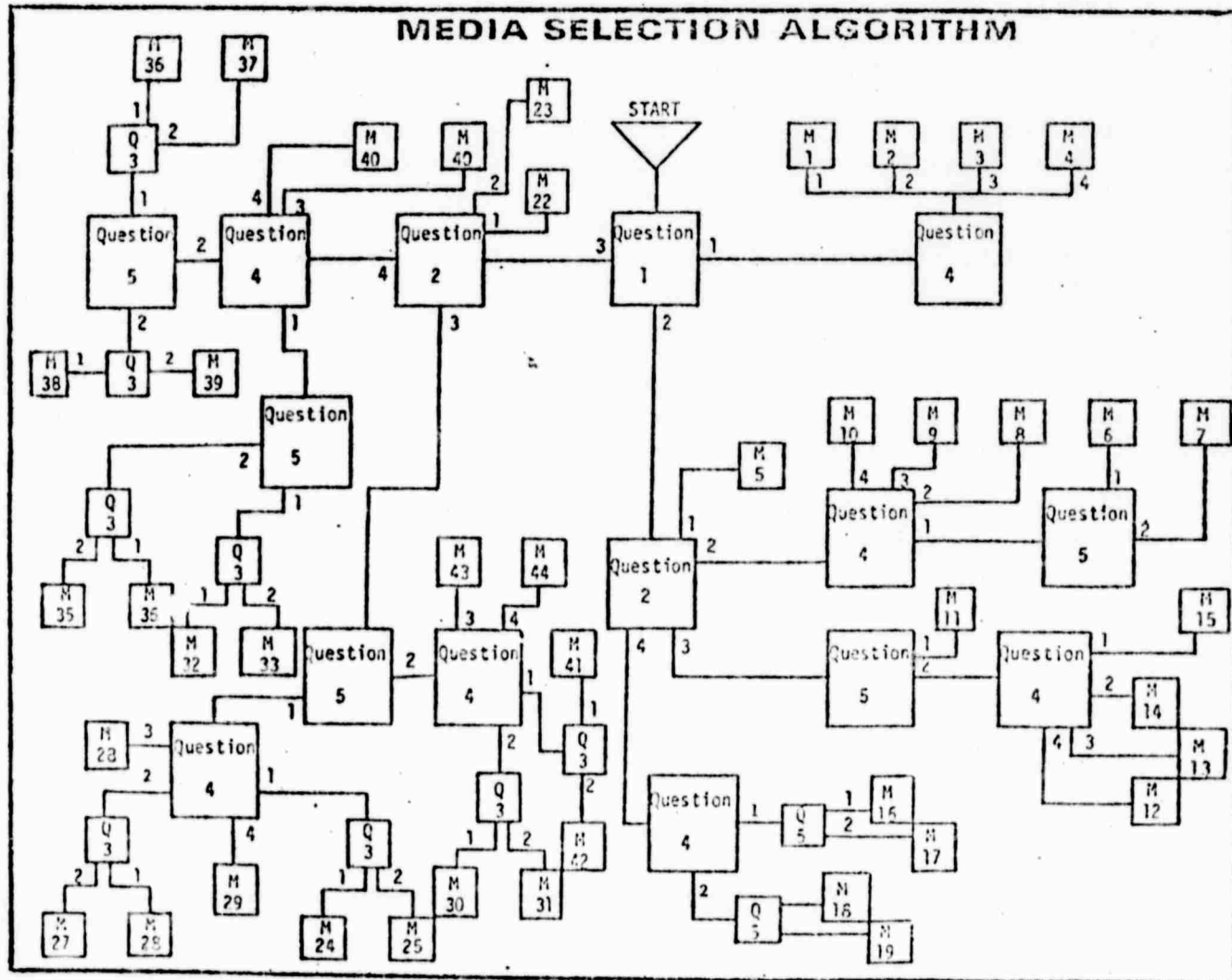
MEDIA SELECTION CHOICES

M1 - Familiarization, Simple Pictoral

    1. Workbook

    2. Mediated Interactive

M2 - Familiarization, Complex Pictoral

    1. Mediated Interactive lecture

    2. Slide/tape present (plotograph)

M3 - Familiarization, motion required

    1. Video tape

    2. Slide/tape w/motion (may not be worth expense)

M4 - Familiarization, Interactive

    It is probably a waste of time and resource to teach this objective

    at a familiarization level

M5 - Discriminated recall, familiarization

    familiarization level content should not be taught at a recall

    level.

M6 - Discriminated recall, review, simple pictoral, small memorization

    1. Workbook

    2. Slide/tape (Artwork)

    3. Mediated Interactive lecture

M7 - Discriminated recall, review, simple pictoral, large memorization

    1. CAI

    2. Workbook

    3. Slide/tape (photographs)

M8 - Discriminated recall, review, complex pictoral

    1. Slide/tape (photographs)

    2. Mediated Interactive lecture

M9 - Discriminated recall, review, motion required

    1. Video tape

    2. Slide/tape with motion

    3. Mediated Interactive lecture

M10 - Discriminated recall, review, Interactive

Why is an interactive presentation needed to teach discriminated recall

behavior?

M11 - Discriminated recall, concept, small memorization

    1. Workbook

    2. Mediated Interactive lecture

note: You may want to combine this objective with the classification

level objective dealing with this content.

M12 - Discriminated recall, concept, large memorization, simple pictoral

    1. CAI

    2. Workbook

    3. Slide/tape (Artwork)

M13 - Discriminated recall, concept, large memorization, complex pictoral

    1. Slide/tape with photographs

    2. Workbook

M14 - Discriminated recall, concept, large memorization, motion required

    1. Video tape

    2. Slide/tape w/motion sequences

    3. Mediated Interactive lecture

M15 - Discriminated recall, concept, large memorization, interactive

Why do you need an interactive presentation to teach a discriminated

recall level behavior?

M16 - Discriminated recall, rule-using, simple pictoral, small memori-

    zation.

    1. Workbook w/Audio only tape

    2. Mediated Interactive lecture

note: You may not want to combine this objective with the workbook

portion of the rule-using level objectives dealing with the content.

M17 - Discrimination recall, rule-using, simple pictoral, large memori-

    zation

    1. CAI

    2. Workbook w/Audio only tape

    3. Slide/tape (Art)

M18 - Discrimination recall, rule-using, complex pictoral, small memori-

    zation

    1. Slide/tape w/photographs

    2. Workbook w/Audio only tape

M19 - Discriminated recall, rule-using, complex pictoral, large memori-

    zation

    1. Slide/tape w/photographs

    2. Workbooks w/Audio only tape

M20 - Discriminated recall, rule-using, motion required

    1. Video tape

    2. Slide/tape w/motion

    3. Mediated Interactive lecture

M21 - Discriminated recall, rule-using, Interactive

Why do you need interactive simulation to teach discriminated recall

behavior?

Familiarization level content should not be taught at a ule-using level

Media 23 - Rule-using, review

1. Workbook
2. CAI

Media 24 - Rule-using, small memorization, simple pictoral, small number of examples

1. Workbook
2. CAI
3. Mediated interactive lecture
4. Slide/tape (Artwork)

Media 25 - Rule-using concept, small memorization, simple pictoral, large number of examples .

1. CAI
2. Random Access Slide/tape w/workbook
3. Slide/tape w/workbook
4. Mediated interactive lecture

Media 26 - Rule-using, concept, small memorization, complex pictoral, small number of examples

1. Slide/tape (photographs)/workbook
2. Workbook
3. CAI
4. Mediated interactive lecture

Media 27 - Rule-using, concept, small memorization, complex pictoral, large number of examples

1. CAI
2. Random Access Slide/tape/workbook (photographs)
3. Mediated interactive lecture
4. Workbook

Media 28 - Rule-using, concept, large memorization, simple pictoral, small number of examples

1. Workbook
2. CAI
3. Mediated interactive lecture
4. Slide/tape/workbook (Art)

Note: Be sure you have a separate objective to teach the large memory component of this objective at the discriminated recall level

Media 29 - Rule-using, concept, small memorization, interactive

1. CAI
2. Workbook
3. Random Access Slide/tape, Workbook
4. Mediated interactive lecture

Note: Be sure you have a separate objective to teach the large memory component of this objective at the discriminated recall level

small number of examples

1. Slide/tape/workbook (photographs)
2. CAI
3. Mediated interactive lecture
4. Workbook

Note: Be sure you have a separate objective to teach the large memory component of this objective at the discriminated recall level.

Media 31 - Rule-using, concept, large memorization, complex pictoral, large number of examples

1. CAI
2. Random Access Slide/tape/workbook (photographs)
3. Mediated interactive lecture
4. Workbook

Note: Be sure you have a separate objective to teach the large memory component of this objective at the discriminated recall level.

Media 32 - Rule-using, rule content, simple pictoral, small memorization, small number of examples

1. Workbook
2. CAI
3. Mediated interactive lecture
4. Slide/tape/workbook (Art)

Media 33 - Rule-using, rule content, simple pictoral, small memorization, large number of examples

1. CAI
2. Random Access Slide/tape/workbook (Art)
3. Workbook
4. Mediated interactive lecture

Media 34 - Rule-using, rule content, simple pictoral, large memorization, small number of examples

1. Workbook
2. CAI
3. Mediated interactive lecture
4. Slide/tape/workbook (Art)

Note: Be sure you have a separate objective to teach the large memory component of this objective at the discriminated recall level.

Media 35 - Rule-using, rule content, simple pictoral, large memorization, large number of examples

1. CAI
2. Random Access Slide/tape/workbook (Art)
3. Workbook
4. Mediated interactive lecture

Note: Be sure you have a separate objective to teach the large memory component of this objective at the discriminated recall level.

Media 36 - Rule-using, rule content, complex pictoral, small memorization, small number of examples

      1. Slide/tape/workbook (photographs)

      2. CAI

      3. Mediated interactive lecture

      4. Workbook

Media 37 - Rule-using, rule content, complex pictoral, small memorization, large number of examples

      1. CAI

      2. Random Access Slide/tape/workbook (photographs)

      3. Mediated interactive lecture

      4. Workbook

Media 38 - Rule using, rule content, complex pictoral, large memorization, small number of examples

      1. Random access slide/tape/workbook (photograph)

      2. CAI

      3. Mediated interactive lecture

      4. Workbook

Note: Be sure you have a separate objective to teach the large memory component of this objective at the discriminated recall level.

Media 39 - Rule using, rule content, complex pictoral, large memorization, large number of examples

      1. CAI

      2. Mediated interactive lecture

      3. Random access slide/tape/workbook (photograph)

      4. Workbook

Note: Be sure you have a separate objective to teach the large memory component of this objective at the discriminated recall level.

Media 40 - Rule using, rule content, motion required or interactive

      1. A simulator or the actual equipment, worksheet and an Audio Only tape

      2. CAI simulation

      3. Videotape simulation

Media 41 - Rule using, concept, large memorization, simple pictoral, small number of examples

      1. Workbook

      2. CAI

      3. Mediated interactive lecture

      4. Random access slide/tape with workbook

Note: Be sure you have a separate objective to teach the large memory component of this objective at the discriminated recall level.

Media 42 - Rule using, concept, large memorization, large number of examples

      1. CAI

      2. Random access slide/tape w/workbook

      3. Mediated interactive lecture

      4. Workbook with Audio only tape

Note: Be sure you have a separate objective to teach the large memory component of this objective at the discriminated recall level.

Media 43 - Rule using, concept, large memorization, motion required

      1. Video tape

      2. Mediated interactive lecture (with VT)

      3. Slide/tape with motion

Note: Be sure you have a separate objective to teach the large memory component of this objective at the discriminated recall level.

Media 44 - Rule using, concept, large memorization, interactive

      1. Simulator

      2. Actual equipment with workbook and audio only tape

      3. CAI Simulation

      4. Video tape

Media 45 - Rule using, concept, small memorization, motion required

      1. Videotape

      2. Slide/tape with motion

      3. Mediated interactive lecture (with VT)

The description of some specific media categories are presented below:

This list is far from exhaustive, and the media hardware devices which can be used to present these types of instruction vary widely. however, this list does present a representative sample of the range of media available.

1) **Mediated Interactive Lecture (MIL)**

As with any lecture, the major portion of the instructional material is a MIL presented verbally by an instructor to a group of students. However, as the name states, a MIL must be both mediated and interactive.

A MIL requires two hard copy products, student worksheets, and visual aids. The student worksheet includes a set of lesson objectives, the generalities for each objective, necessary charts, tables, and figures, and a set of practice item response sheets for each objective. The type of visual aids used in a MIL may include overhead transparencies, slides, or videotapes, depending on the display requirements of the lesson. These aids are used where appropriate to present supporting information, sets of examples, and sets of practice items.

In order for a lecture to be adaptive to student needs, it must be interactive. An interactive lecture provides the instructor with an outline which requires him to ask the students questions and alter his presentation based on student responses.

2) **Printed Text**

The defining characteristics of a Printed Text is that all instructional components are presented in printed form. Printed Text may be developed for a set of objectives that require the student to perform at a remember (recall, or recognize) behavior level only, or for objectives that require the student to perform at a classification or rule-using behavior level.

The organization and format of workbook ensures that all instructional components are present. The workbook begins with a lesson introduction and a set of instructions explaining how to proceed. Each segment (corresponding to one objective) begins by presenting the objective, the generality and the supporting explanation or help. Where necessary, the examples are accompanied by additional "helps". The practice items are designed to require the student to behave at the level designated in the objective. The practice set is accompanied by a feedback and help section.

3) **Slide-Tape Presentation (ST)**

A slide-tape presentation contains two separate components: a set of slides, or photographic frames, audio sections, (a student worksheet may be included). The ST presentation is normally used for recall level objective that require complex graphics and/or lengthy explanations.

4-16

The audiotape begins with an introduction. For each objective, it restates the generality and presents additional supporting information. The slides, of course, complement the audiotape. When working with classification and rule-using level objectives, a series of examples is presented with accompanying "helps" where needed. A set of practice items is presented next. The student is told to stop the tape after each question and write his answer on his worksheet. When the tape is started again, it gives feedback and help for that item.

4) Random-Access Slide Presentation (RAS)

A random-access slide presentation contains two components: a set of slides presented via a random-access slide projector or Dossier Cue/See student workbook, an an audio only tape. An RAS presentation is used to present lesson material for classification and rule-using level objective. This medium allows for visual presentation of large numbers of examples and practice items without sacrificing the freedom of movement (i.e., learner control) lost in the linear ST or videotape (VT) presentation.

The workbook presents tables of numbered example items and practice items. The student can use these tables to check those examples he has viewed, or the practice items he has worked. The practice table also provides space for the student's response.

The random-access slides are used to present an expanded version of the generality, the set of examples with helps, practice items, and feedback.

5) Videotape Presentation (VT)

A videotape presentation contains two components: a videotape cassette and a student worksheet. The use of these two components is exactly parallel to the use of corresponding components of the slide-tape presentation. The major difference between these two media is the type of display capability. The instructional strategy used is similar in both types of media.

Because the development cost for VTs can vary widely depending on the type of effect needed, categories of VT complexity need to be specified. Five representative categories have been designated VT (#1), VT (#2), VT (#3), VT (#A), VT (#M). Each of these categories will be described below:

An animated videotape (VT (A)) presents abstract concepts and ideas through the use of cartooning. This type of videotape is used when motivation is a critical requirement.

A level three videotape (VT (#3)) is the result of professional treatment for both the direction and production aspects of the process. Production techniques and features available for instructional utilization are superimposition (labeling), slow-motion, and special effects generation (attribute isolation), multiple fades, dissolves, wipes, special effects, music, and audio mixing. This level videotape includes full dramatization with quality acting, in total or in part from tightly written and storyboarded scripts. Essentially, this is the high content/high effect cadillac of videotape production.

A level two videotape (VT (#2)) receives a like production effort as that received by a Level 3, but dramatization is omitted. Voice-over or on-screen narration delivers content. Superimposed labels, lists, etc., are more prevalent. Motivation is carried largely through camera movement and post-production special effects generation.

A level one videotape (VT (#1)) is a one-camera effort, either live action, voice-over, or a mixture of this and the "big talking face" approach. Motivation is minimal in comparison to a Level 3 or 2 (i.e., special effects generation and "slick" videotape techniques) available in an extensive post-production effort and reduced to more straightforward editing.

A "home move" level videotape (VT (#H)) normally utilizes edit-in-the-camera techniques with lightweight, often hand-held portable equipment. This level is often black and white with a minimum quality lighting effect. All narration is voice-over and may be recorded along with the video.

6) Computer-Assisted Instruction (CAI)

The defining characteristics of computer-assisted instruction is that it presents interactive expository and inquisitory instruction through direct interface with a computer. It is distinguished from a trainer in that it is not designed for simulation purposes.

Because computers are programmable, it is possible for any hardware system to present instruction containing all basic instructional requirements. However, preference should be given to any system which economically and efficiently fulfills all of the basic instructional requirements outlines above.

7) Hands-on Exercises

A hands-on exercise is used to allow the student to practice classification rule-using procedure-using behaviors in a simulated real world environment. The type of hardware equipment used depends on the degree of fidelity to the real world required. Hands-on exercises will normally be used with RAS, ST, or workbooks.

In addition to the obvious requirement for a hands-on exercise to include the use of any real or simulated equipment used in the actual job environment, it also includes an Audio only tape.

The Audio tape presents the student with the set of lesson objectives, a lesson introduction, and a set of instructions describing what he should do to be prepared for the exercise. The Audio tape then presents any information the student will need for mission planning purposes, and it spells out exactly what planning he will need to have prepared. The Audio tape then outlines in detail the procedures or actions the student should perform. Previously mastered procedures are referred to by name without the accompanying list of steps.

Guilford, N. L. Current research on the relative effectiveness of
        selected media characteristics. Pittsburg, Pennsylvania:
        Westinghouse Electric Corporation, Research & Development
        Center, October 1973. (This reference presents research
        findings on the effect of using various media characteris-
        tics, viz., picture detail, color, motion, and integrated
        media.)

TRADOC PAMPHLET 350-30. ISD: Phase III. Fort Monroe, Virginia:
        U. S. Army Training and Doctrine Command, August 1975.
        (Pp. 106-124 present a rationale for media selection and
        presents a detailed decision process for deciding upon
        the best medium from among all available media.)

U. S. Navy. Specifications for instructional systems development
        for operator job training related to emerging weapon systems.
        Orlando, Florida: Human Resources Laboratory, (no date
        available). (This document presents the development of a
        media selection algorithm.)

4.1.2 TEC Lesson Length

The next most significant de-
cision to be made is the length of
the lesson, or, how many kits are
required to package the total TEC
lesson. Although overall lesson
length is of relatively little
importance for PT lessons, each
PT lesson should consist of easily
comprehensible parts, e.g., kits
which require approximately 50
minutes to read and to work the
practice exercises. JPAs are by
nature shorter than the other TEC
lessons. For AV and AO lessons,
length and number of kits are
problems. Many factors have to
be considered since actual lesson
length requires a trade-off among
multiple inputs.

4-19

Providing realistic and measurable standards for each soldier's training and career progression is a guiding philosophy of the U. S. Army. As discussed in Chapter 1, it is the Enlisted Personnel Management System (EPMS) that establishes the relationship among grade structure, required skills; and levels of training for each Military Occupational Speciality (MOS). As integral parts of EPMS, TEC lessons are related to Soldier's Manuals tasks and the SQTs. These form the nucleus for the development of a Job Training Package based on a task analysis of a soldier's entire job (part of an MOS, or sometimes a complete MOS).

In the past, the development of TEC lessons focused on individual tasks, e.g., the assembly and disassembly of the M60 machine gun. The lesson content was based on a systematic analysis of individual tasks but not of the tasks for a complete MOS. Future efforts must have a wider scope. The systems analysis approach to Job Training Package (JTP) development will provide you with a complete listing of training objectives for a job. Completion of the analysis requires grouping the objectives into sets or subsets which can be packaged into job based lessons. Knowing the time it takes to convey each objective provides some idea of the length of an individual lesson. Lengthy lessons may require subdivision into more manageable units, i.e., multiple kits.

ISD Model and Lesson Grouping. According to the ISD model, the Analysis and Design sections of each school are responsible for defining and describing jobs as well as the duties associated with each job. These duties are then broken down into task statements. Finally, the tasks are described in terms of their basic behavioral elements.

4-20

referenced test items that are required to teach the task elements of each TEC lesson. If this is not done elsewhere you will have to perform the above function. An example of a task description for a duty position that can be used to determine what behavioral elements to teach in a TEC lesson is given below.

Job: MOS 72 C - Central Office Switchboard Operator

Duties:

1. Installation and operation of Switchboard Telephone, Manual SB-22/PT

2. Installation and operation of Manual Telephone Switchboard SB-86/P

3. Installation of Central Office Telephone, Manual AN/MTC-1

4. Operation of Central Office Telephone, Manual AN/TTC-23, AN/MTC-1, AN/MTC-9

5. Operation and maintenance of generators

Tasks: (Duty #1)

1. Field telephone operation TA-312/PT

2. Preinstallation checks of switchboard telephone, Manual SB-22/PT

3. Line and trunk connections of switchboard telephone, Manual SB-22/PT

4. Line-to-line and recalls with switchboard telephone, Manual SB-22/PT

5. Line-to-calling-party and emergency checks with switchboard telephone, Manual SB-22/PT

6. Conference calls and trunk calls with switchboard telephone, Manual SB-22/PT

Elements: (Duty #1, Task #2)

1. Install batteries

2. Preinstallation checks

   a) check #1

   b) check #2

A TASK IN TERMS OF ITS ELEMENTS WITH TWO WAYS TO PACKAGE THE TEC LESSON

the task analysis, the training objectives, and the criterion-referenced test items with subject matter experts (SME). The purpose of this review is to insure the validity of objectives, the compatability with present training, and the relationship to current soldiers' manuals.

The TEC developer (either the school or a contractor) is responsible for grouping task elements into individual TEC lessons. A TEC lesson, however, can be composed of one or more TEC kits. A TEC kit is the packaged material, e.g., the audio tape in an AO kit, used to present a lesson or a logical subdivision of it. The difficult part is deciding how many TEC kits are needed to convey the terminal training objectives of each TEC lesson. One task, however, does not have to be covered in a single TEC kit; it can span two or more kits. Similarly, if tasks are relatively simple, one kit could cover two or more tasks. One way to decide on the number of kits necessary for one lesson is to sketch out the complete lesson first. Then, an estimate of time for presenting the complete lesson can be made. If the lesson is too long, you can divide it into several kits at logical breaks within the lesson.

to describe it is the next factor that
relates to overall lesson length, i.e.,
how should the training objectives be
stated to insure an effective TEC
lesson. Therefore, the TEC developer
should follow a set of systematic
guidelines, e.g., those discussed
in the ISD model (Block II.1 pp. 1-34)
or TRADOC Pamphlet 350-31 (pp. 18-23).
Applying these guidelines (stated
below) to each lesson will aid the
structuring and formatting of each
TEC kit.

• EXPLICITLY STATE EACH OF THE TRAINING OBJECTIVES FOR EACH TEC LESSON
  ACCORDING TO:

    1. ACTION TYPE
       - SPECIFIC
       - GENERALIZED SKILL
       - GENERALIZED BEHAVIOR OR ATTITUDE

    2. DESCRIPTION
       - FULL
       - PARTIAL
       - STATED ONLY

    3. RELEVANCY
       - HIGH
       - MODERATE
       - LOW

    4. COMPLETENESS
       - ACTION, STANDARDS, AND CONDITIONS
       - ACTION AND CONDITIONS OR STANDARDS
       - ACTION ONLY

    5. PRECISION
       - FULL
       - PARTIAL
       - VAGUE

• TO THE EXTENT POSSIBLE, INCLUDE ACTIVE PRACTICE AS PART OF THE LESSON.

• ADD GUIDANCE AND PROMPTS TO LEAD THE STUDENT THROUGH THE LESSON.

• PROVIDE FEEDBACK TO STUDENT.

• DESCRIBE CRITERION-REFERENCED TEST ITEMS IN TERMS OF THE OBJECTIVES.

- The following is a training objective that states a specific action; contains a full description; is highly relevant; is complete with stated action, standards, and conditions; and is fully precise.

  SCHEDULE PREVENTIVE MAINTENANCE ON RADIO SET AN/VRC-12 FOR MONTH OF JULY 1978 WHEN GIVEN DD FORM 314, TM 38-750, TM 11-5820-401-20, AND DATE OF LAST SERVICE. THE COMPLETED SCHEDULE SHOULD CONTAIN NO MORE THAN TWO ERRORS WHEN PREPARED IN 15 MINUTES.

- The following training objective states a specific action, but, it contains no description, has questionable relevancy, is incomplete, and is vague.

  FIELD STRIP A RIFLE.

$$\begin{array}{c}\text{LENGTH} \\ \text{OF} \\ \text{TEC KIT}\end{array} = \begin{array}{c}\text{STIMULUS} \\ \text{TIME}\end{array} + \begin{array}{c}\text{RESPONSE} \\ \text{TIME}\end{array}$$

- STIMULUS TIME SHOULD NOT EXCEED 20-30 MINUTES

Stimulus/Response Time. The total length of a TEC kit is the combination of stimulus time and response time. These times and the ratio of the two are all important in determining lesson length.

ISD states that most individuals cannot remain completely attentive during a 20-30 minute period. Thus, a TEC lesson should not contain a continuous running narrative. The total stimulus time should not exceed 20-30 minutes. You should break this time at logical intervals to actively involve the student in the lesson. The active participation is the response time component of the lesson.

There are two ways to include active participation in the lesson: having the student answer questions during and after the lesson, and using practical exercise. The exercises acquaint the student with the equipment while the lesson explains how to use it. For example,

4-24

dents watch is not as effective as allowing each student to disassemble the weapon while providing individualized instruction. Active participation always includes student feedback. Providing correct answers and reassuring comments lets the student know what is wrong, what is right, and how his performance can be improved.

The ratio of narrative to response time is a function of how many review questions and practical exercises are used in the lesson. Frequently, the response time will exceed the stimulus time.

Number of Visuals. If you are supervising or monitoring the development of a TEC kit, it is important to have an idea of how many visuals you will need because lesson length is also a function of number visuals. For example, if you are designing a lesson for the disassembly of an M16A1 rifle, do not plan a series of visuals of isolated weapon parts when a single exploded view would be more effective. Specifying the number of visuals to support the associated narrative for a particular TEC kit will help structure its overall length. The number of visuals per kit should be consistent with TEC Request for Proposals (RFPs)/contracts.

Training Objectives and Criterion-Referenced Test Items. The final factors to be considered for lesson length determination are the numbers of training

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ACTIVE PARTICIPATION

- REVIEW QUESTIONS

- PRACTICAL EXERCISES

RULES-OF-THUMB FOR TRANSLATING SINGLE FRAMES/VISUALS (NO ANIMATION) INTO LESSON TIME:

1. AVERAGE NUMBER OF VISUALS PER KIT = 120

2. 150 FRAMES = APPROXIMATELY 35 MINUTES

4-25

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TEC LESSON ON THE "X" VEHICLE


OBJECTIVES: 1. REPLACE THE "Y"

            2. REMOVE THE "W"

            3. TURN THE "V"

            4. CHECK THE "Z"
```
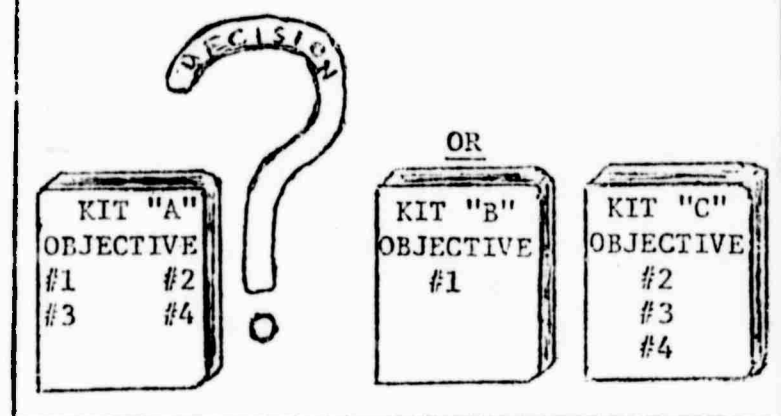

criterion-referenced test items to include a single TEC kit. The training objectives state what a student should learn in a TEC lesson. The criterion-referenced test items measure how well the student has learned the training objective. The number of training objectives per lesson depends on the amount of time needed to teach the tasks that are required to achieve the terminal training objective. The number of criterion-referenced test items for the lesson depends on the number of tasks. How to divide the training objectives and test items among the kits must still be determined. Consider the training objective - to be able to install new batteries in a radio. To achieve this objective, a student may have to know specific information, e.g., knowing which batteries to install, positioning the batteries, locking the battery compartment, etc. Therefore, the number of criterion-referenced test items should be the number needed to measure the learning of the objective, e.g., what type of batteries do you install, how do you place the batteries in the radio, how is the battery compartment closed and locked, etc? Depending on the length of the total lesson, this may require only one kit or more than one.

A final consideration is the importance of each training objective. Some objectives may be more critical than others (e.g., those that concern surviving in combat). Therefore, more lesson time (if more time is needed to teach the objective in greater detail) may have to be devoted to these more critical objectives. (See Chapter 5 for rating the importance of training objectives.)

TRADOC PAMPHLET 350-30. ISD: Phase I. Fort Monroe, Virginia: U. S.
Army Training and Doctrine Command, August 1975. (Job analysis
is discussed in Blocks 1.1 and 1.2, pp. 1-155.)

TRADOC PAMPHLET 350-30. ISD: Phase II. Fort Monroe, Virginia: U. S.
Army Training and Doctrine Command, August 1975. (Developing
training objectives is discussed in Block II.1, pp. 1-34.)

TRADOC PAMPHLET 350-31. (Draft). Preparing extension training. Fort
Monroe, Virginia: U. S. Army Training and Doctrine Command, February
1976. (Pp. 18-23 discuss the development and statement of training
objectives.)

Consult Recent TEC Request for Proposals (RFPs) for any specific guidance
provided for stimulus/response times and number of visuals.

4.1.3 Target Audience Considerations

TEC lessons are developed to train
the audience. Soldiers must be able to
perform the critical tasks of their
primary MOS. And, the TEC system
will facilitate the training of these
tasks. This facilitation will occur,
however, only if the target audience
understands the TEC lesson. There-
fore, you have to be aware of the skill
levels the audience brings to the
training environment. In addition,
you have to (1) pitch the instruc-
tional materials to the ability
level of the audience; and (2) use
the appropriate nomenclature of the
specified task.

Reading Level. In the past,
most instructional materials were
printed. Thus, comprehension was
closely related to reading ability.
Presently in TEC, however, approxi-
mately 80% of all TEC kits are de-
veloped in media other than printed.
Therefore, instead of reading ability,
the verbal comprehension of the
target audience should establish the

> TARGET AUDIENCE
>
> - USE APPROPRIATE READING
>   AND COMPREHENSION LEVELS
>
> - USE APPROPRIATE
>   NOMENCLATURE

Reading ability of individuals can be determined by a quantitative measure, the readability score. In general, a low readability score predicts a low comprehension level. An extension of readibility formulas is the estimation of school grade levels. Grade level refers to those students who reach a specified criterion level on a comprehension test. For example, a readability score of 8 means the individual is reading at the same level as an average reader in the 8th grade (at the time the reading level standards were established).

Thus, if you can determine the reading ability or verbal comprehension of the target audience from available data, e.g., service entrance examinations, do it. Otherwise, you will be forced to make subjective judgments regarding the target audience's comprehension. If you guess too low, you will be talking down to the audience which they will resent. On the other hand, if you guess too high, no one will understand the material.

The subject matter experts and the resident instructors should have a feel for the audience. They should have the final judgment and should work to insure that the reading level of the lesson does not exceed the expected reading level of the target audience. To assist this process a method such as FORECAST may be useful.

FORECAST was developed for the Army and has been validated and cross-validated. It is a quality control tool used to check

> - DO NOT TALK DOWN TO THE AUDIENCE
>
> - DO NOT OVERWHELM THE AUDIENCE

the reading level (and possibly, the
comprehension level) of verbal material.
Use FORECAST to check completed material
and to establish a criterion to direct
TEC lesson development.

USING FORECAST[*]

General Instructions

1) Select a 150 word passage from connected discourse. Do not
   use this formula to check unconnected statements. It's
   best to start counting words at the beginning of a paragraph
   or section.

2) Counting the Words:
   Words include numbers, letters, symbols, and groups of
   letters that are surrounded by white spaces. Hyphenated
   words and contractions are counted as one word: "couldn't",
   "F.O.B.", "i.e.", "$32,008", "second grade".

3) Counting the Syllables:
   Count syllables the way the word is pronounced: such as
   "row" has one syllable, "mention" has two. With symbols and
   figures the syllables are known by the way they normally read
   aloud, such as, one syllable for ("cents"), three for R.F.D.
   ("are-eff-dee"), and four for 1918 ("nineteen eighteen").
   When in doubt about syllables, consult a dictionary.

Step 1. Count the number of one syllable words in a 150-word
passage.

Step 2. Divide the number by 10.

Step 3. Subtract the result from 20 to obtain the reading grade
level.

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[*]

Adapted from Kern, Sticht, Welty, & Haube, 1975.

4-29

Nomenclature. Only necessary
technical terms should be placed
in the TEC lessons. Any terms
or phrases peculiar to the Army
and the MOS, however, can be used.
All such terms should be fully
explained to help the student
understand. Special abbreviations
or acronyms may require an ex-
planation of the phonetics.

Bibliography for 4.1.3

Caylor, J. S., Sticht, T. G., Fox, L. C., & Ford, J. P. Methodologies for
determining reading requirements of military occupational specialities
(HumRRO-TR-73-5). Alexandria, Virginia: Human Resources Research
Organization, March 1973. (Pp. 5-18 describe how FORECAST was
developed and how it was validated.)

Kern, R. P., Sticht, T. G., Welty, D., & Haube, R. N. Guidebook for the
development of Army training literature. Alexandria, Viriginia:
Human Resources Research Organization, November 1975. (This re-
ference illustrates the FORECAST method.)

Kincaid, J. P., Fisburne, R. P., Jr., Rodgers, R. L., & Chissom, B. S.
Derivation of new readability formulas for Navy enlisted personnel
(Research Branch Report). Millington, Tennessee: Chief of Naval
Technical Training, February 1975. (AD A006 655) (This report
describes how to compute three readability formulas - the Automated
Readability Index (ARI), the Fog Count, and the Flesch Reading
Ease Formula.)

4.1.4 Self-Evaluation

Structure the self-evalua-
tion to maximize the active
participation of the trainee
and to insure his involvement
in the lesson content. The
self-evaluation should ask
the student what he has
learned, provide him with the
correct answer, and tell why
it is correct. Applying the
principles of programmed instruc-
tion is one systematic way to as-
sure both the trainee's involve-
ment and the transfer of information.

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SELF-EVALUATION = STUDENT PARTICIPATION

  • USE REVIEW QUESTIONS

    APPLY PROGRAMMED INSTRUCTION
  • PRINCIPLES
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Quiz Structure. To effectively teach the training objectives, your TEC lessons must include active audience participation. Review questions can provide this participation when well constructed and placed appropriately in the lesson. Review questions should be presented immediately after each new procedure or idea (i.e., learning objective) with the trainee given time to answer (a pause in AC or AV and an answer key in a PT). At the end of the lesson, a quiz that covers the entire lesson should be presented. The quiz should include feedback to the student.

Quizzes within a TEC lesson are not mandatory and, of course, some lessons do not require them. For example, a JPA has no review questions because the purpose of a JPA is to assist an individual in the performance of a task. On the other hand, a JPA demands continuous audience participation.

A _Systematic Approach_. One systematic approach that is useful for structuring review questions is programmed instruction. By using the principles of this technique, you can directly involve the student in the lesson. Basically programmed instruction presents the student with informantion to which he must respond before he can proceed with the rest of the lesson. Then the student is given the correct answer. He then proceeds to the next piece of information. The programmed instruction approach allows the student to proceed at his own pace and requires that he actively participate in the lesson. The question/answer feedback and student participation facilitate the learning of the lesson objective.

- USE REVIEW QUESTIONS THROUGHOUT LESSON

- PLACE QUIZ AT THE END OF THE LESSON

- PRESENT INFORMATION IN UNITS.

- ASK A QUESTION BASED ON THAT INFORMATION. THIS PERMITS THE STUDENT TO ACTIVELY RESPOND.

- AFTER ALLOWING THE STUDENT THE OPPORTUNITY TO RESPOND, GIVE THE CORRECT ANSWER, AND EXPLAIN WHY IT IS CORRECT. CONTINUE IN THE SAME MANNER FOR THE REMAINING INFORMATION UNITS.

- PRESENT A COMPLETE QUESTION/ANSWER REVIEW IMMEDIATELY AFTER THE LESSON HAS ENDED.

4-31

Bibliography for 4.1.4

TRADOC PAMPHLET 350-30. ISD: Phase IV. Fort Monroe, Virginia: U. S.
    Army Training and Doctrine Command, August 1975. (Programmed in-
    struction is discussed on pp. 246-247.)

4.1.5 Level of Pictorial Detail

Guidelines for pictorial de-
tail are required for all lessons
involving visuals.

*Realism and School Accept-
ability*. How realistic do the
visuals have to be in order to
teach the lesson objectives?
Your might assume that the more
realistic the illustration, the
greater the probability that
learning will occur. This is
not necessarily true. One study
authorized by ATSC compared two
versions of the same TEC
lesson. One version contained
complex illustrations with ex-
tensive detail and background;
the other had simple illustra-
tions with background and uniform
detail removed. The results
showed there were no differences
in learning between the two
lesson types. In addition, soldier'
attitudes toward the two versions
were equivalent. (See Biege, Borg,
& Schuller, 1977 for details.)
Therefore, when you use visuals
you should be more concerned about
the suitability of the information
content than with the detail of
the visuals.

- STRIKE A BALANCE BETWEEN QUALITY
  AND DETAIL. VISUALS (ESPECIALLY
  PHOTOGRAPHS) MAY INADVERTENTLY
  HIDE A CRITICAL FACTOR IN SHOWING
  REQUIRED RELATIONSHIPS.

- NEVER USE VISUALS TO EMPHASIZE A
  POINT OF VIEW THAT THE TECHNICIAN
  WILL NEVER ACTUALLY SEE.

4-32

Even though these data show the drawings do not have to be exact to train soldiers, some schools believe any decpiction of soldiers and equipment should be 100% accurate. For example, it may be a waste of time and money to draw a detailed picture of M60A1 tank to illustrate the location of the two machine guns when a outline drawing would suffice. There will be times, however, when exact detail is essential. For example, a lesson on how to dress properly would require a properly dressed soldier. On the other hand, a lesson showing the operation of a squad radio should place more emphasis on the drawing of the squad radio than on the soldier operating it. The TEC manager should use the minimum level of detail which is: (a) believed by SMEs to be effective and (b) acceptable to school personnel.

IS THERE A DIFFERNECE IN TEACHING VALUE?

7.62 MM COAX MACHINEGUN

CALIBER .50 MACHINEGUN (M85)

DETAILED VISUAL

7.62 MM COAX MACHINEGUN

CALIBER .50 MACHINEGUN (M85)
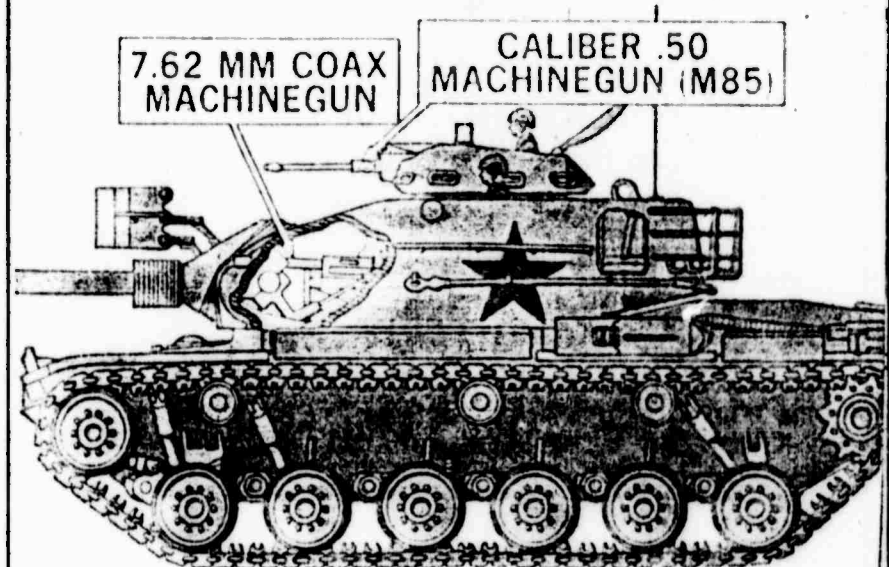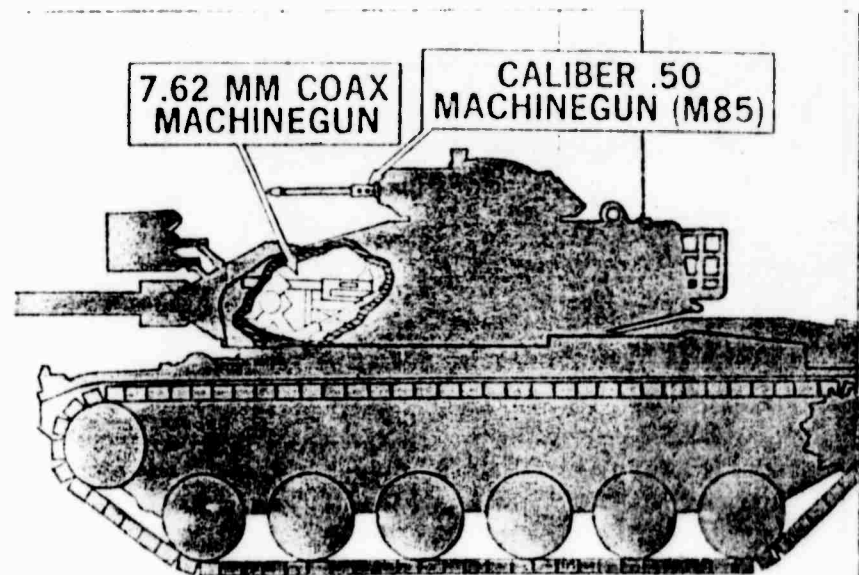
OUTLINE DRAWING

BALANCING A VISUAL

MOS MISMATCHES
DIVERSE MISSIONS
COMPLEX DOCTRINE
EQUIPMENT DENSITY
LOW MANNING LEVELS
HIGH PERSONNEL TURNOVER
LIMITED TRAINING RESOURCES
ADMINISTRATIVE REQUIREMENTS

FORMALLY

INFORMALLY

4-34

Use of the Graphic Arts Guidance Kit. Visuals should generally complement and illustrate the narration by effectively using harmony, contrast, balance, emphasis, and shape. A harmonious display is composed of coordinated elements (lettering, color, etc.). Contrast uses light and dark elements to delinate the forms in the visuals. Balance can either be formal (a symmetrical arrangement of all elements), or informal (elements appear balanced although each side of the arrangement is different). Emphasis refers to the proper use of lettering, color, or other directional aids to stress a central idea. Shaping means guiding the viewer through a visual in proper sequence. The Graphic Arts Guidance Kit (GAGK) provides you with detailed standards for using those characteristics to develop quality visuals.

GAGK is availabe from ATSC-TPD and you should consult it for specific guidance when developing or monitoring the development of the TEC lesson visuals. Although designed to provide uniform standards for TEC Beseler Cue/See lesson visuals. GAGK can be applied to any of three TEC modes - AV, PT, and JPA.

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CONTENTS OF GAGK

Audiovisual

    A.  Semi-Comprehensive Art

    B.  Final Art

        1. Beseler Cue/See Field Guide
        2. Final Art Aspect Ratios
        3. Registration
        4. Resolution
        5. Type
        6. Color and Contrast
        7. Graphic Style and Photography
        8. Animation and Motion Pictures
        9. Laboratory

Printed Texts

    A.  Visual Dummy

    B.  Master Mechanical
```

Bibliography for 4.1.5

TPD Graphic Arts Guidance Kit (GAGK). Fort Eustis, Virginia: U. S. Army Training Support Center - Training Programs Directorate, (no date available). (A kit which presents information in three media: printed, super 8 mm, and 35 mm slides.)

Biege, R. A., Borg, W. R., & Schuller, C. F. The use of detail and background in visuals and its effect on learner achievement and attitude. Fort Eustis, Virginia: U. S. Army Training Support Center, April 1977. (The complete results of the ATSC study on detail level in TEC lessons.)

```
┌─────────────────────────────────────┐
│ AN AV TEC LESSON IS A FUNCTION OF:   │
│                                      │
│ 1.  LENGTH                           │
│     - FORMAT AND PRESENTATION        │
│     - ANIMATED/MOTION SEQUENCES      │
│     - VISUAL DEVELOPMENT CYCLE       │
│     - STIMULUS/RESPONSE TIME         │
│     - SCRIPT                         │
│ 2.  GRAPHIC ARTS                     │
│     - COLOR                          │
│     - CONTRAST                       │
│ 3.  AUDIO PROCEDURES                 │
│     - RUNNING TIME                   │
│     - CUEING                         │
└─────────────────────────────────────┘
```

Section 4.1 presented criteria that can be applied to all TEC lessons to insure the development of an effective lesson. This section presents criteria specific to AV TEC lessons. The three subsections provide guidance on lesson length, graphic art evaluation and audio technical procedures.

4.2.1 AV Lesson Length

The general considerations for the length of AV lessons are presented in Section 4.1.2. The format of AV lessons, however, is based on the presentation of individual frames, the number of animation and motion sequences, the number and type of visuals, the amount of stimulus and response time, and the length of the script.

Format and Presentation. The AV format is a system of slides (Super 8) with auditory narrations. According to the ISD manual (Block III.4), you should avoid displaying a single frame longer than 20 seconds. Otherwise, the audience will become bored and distracted from the subject matter. If narrations are related to the visuals and must exceed 20 seconds, then use 2 or more similar visuals (e.g., the same equipment viewed from a different angle).

```
┌─────────────────────────────────────┐
│ • SINGLE FRAME SHOULD NOT REMAIN     │
│   ON THE SCREEN LONGER THAN 20       │
│   SECONDS                            │
│                                      │
│ • THE AUDIO PORTION ACCOMPANYING     │
│   EACH FRAME SHOULD NOT EXCEED       │
│   20 SECONDS                         │
└─────────────────────────────────────┘
```

4-36

about 20 seconds per frame exposure,
narration length is also dependent
on speech rate and pauses within
the narration. Average speech rate
is about 120 words a minute. A
comfortable range for most audiences
is 100 to 140 words a minute. Ap-
propriately placed pauses will give
your listeners an opportunity to
digest the information presented.

Normally TEC lesson narrators
should possess a wide range of fre-
quencies within their normal speaking
voice. Use of a voice which pro-
duces mostly high frequencies or
mostly low frequencies can be annoying
and thus distract from the teaching
potential of the lesson. If you
have special requirements for the
voice quality of the narrator (e.g.,
an authoritarian type voice) make
those requirements known before the
TEC lesson goes into reproduction.

Animation and Motion. A unique
feature of the Beseler Cue/See is its
capability to display animated and
motion sequences. An animated sequence
consists of multiple art visuals shown
in rapid succession, whereas a motion
sequence is a motion picture film clip.
Use these techniques only when they
add something to the lesson. For ex-
ample, an animated or a motion sequence
of acquiring and tracking an aircraft
would help the student learn air
defense tactics. On the other hand,
the value of using an animated or a
motion sequence to display the com-
ponents of an M16A1 rifle would be
questionable. GAGK provides specific
guidance for using animated and motion
sequences.

- KEEP THE SPEECH RATE FOR THE NARRATION AROUND 120 WORDS A MINUTE

- ANIMATION AND MOTION CAN AID LEARNING

4-37

Visual Development Cycle. Development of AV visuals is an iterative process that does not begin until a lesson has been outlined and narration has been defined. To the extent possible, you start by determining the number and kind of visuals needed to support the narrative. For contract development, it is important to convey the kind and number of visuals you have in mind. Otherwise, you may receive multiple visuals where one would suffice.

The art development cycle starts with a verbal description of an idea, continues from a thumb-nail sketch to a rough sketched line drawing, and finally to a finished product. The rough sketch is later replaced with a semicomprehensive art, i.e., filled-in color illustrations. The last stage (final art) is a true rendering of precise line work or a full color photograph.
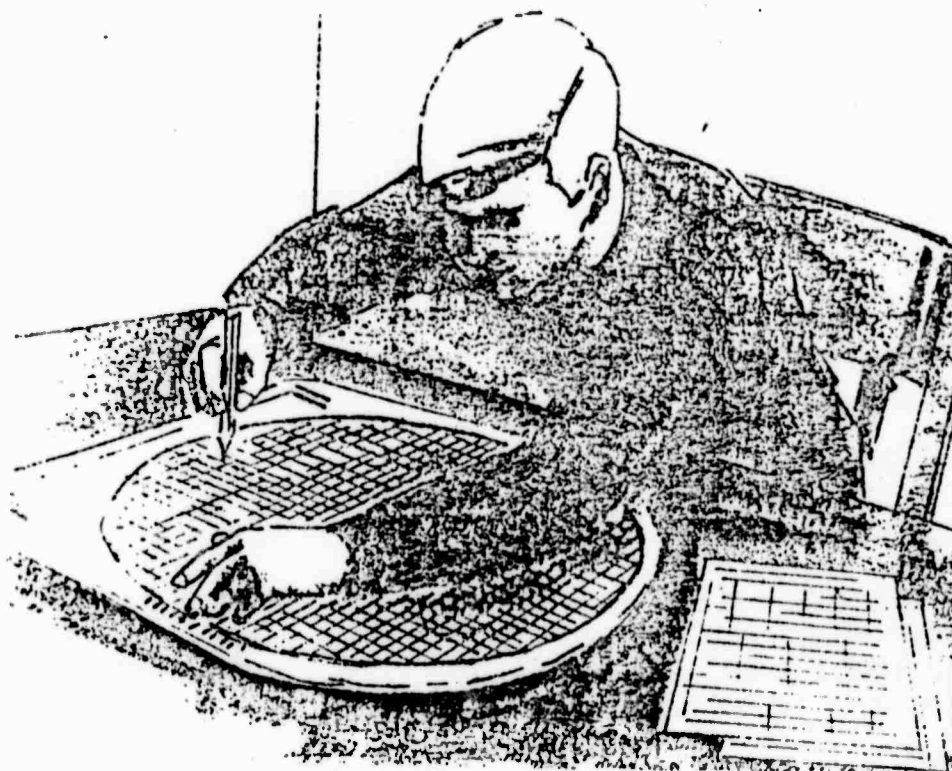
SEMICOMPREHENSIVE ART

FINAL ART

4-39

TEC, visuals are used to supplement and complement the narrative. This affects the division of stimulus and response times. While this division should follow the general guidance of Section 4.1, the specific guidelines given below apply.

- NARRATION (AUDIO) SHOULD BE USED TO EXPLAIN DETAILS, SUGGEST RELATION-SHIPS, AND SUPPLY INFORMATION NOT EXPLAINED IN THE VISUALS.

- USE THE NARRATION TO IDENTIFY OR DESCRIBE THE CONTENT OF A VISUAL AS SOON AS THE VISUAL APPEARS. DO NOT MAKE THE AUDIENCE GUESS WHAT THE CONTENT OF A VISUAL IS ALL ABOUT. TELL THEM.

- NARRATION SHOULD ALWAYS BE SIMPLY WRITTEN, DO NOT USE LONG, COMPLICATED SENTENCE STRUCTURES WITH MULTIPLE CLAUSES. USE A SIMPLE VOCABULARY. TRY TO STRIKE A BALANCE BETWEEN COMPLETENESS AND SIMPLICITY WITHOUT TALKING DOWN TO THE AUDIENCE.

- VARY THE PACE OF THE NARRATION. ALLOW FOR BREAKS OF SILENCE TO BRIDGE DIFFERENT VISUALS.

- CHOOSE WORDS CAREFULLY. WORDS IMPROPERLY CHOSEN MAY EVOKE AN ERRONEOUS MENTAL PICTURE OF AN IDEA OR RELATIONSHIP.

- AVERAGE KIT LENGTH: 25 MINUTES STIMULUS TIME AND 45 MINUTES OF STUDENT RESPONSE TIME.

- MINIMUM KIT LENGTH: 15 MINUTES STIMULUS TIME AND 30 MINUTES OF STUDENT RESPONSE TIME.

- MAXIMUM KIT LENGTH: 40 MINUTES STIMULUS TIME AND 90 MINUTES OF STUDENT RESPONSE TIME.

- USE SHORTER KIT LENGTH TIMES IF THERE IS NO HANDS-ON PRACTICE COMPONENT.

A recent TEC request for proposal (RFP) lists average, minimum, and maximum kit lengths (see box at left) in terms of narration (stimulus and student response time for kits involving hands-on practice. Without a hands-on component your kit should not exceed the previously noted 20-30 minute maximum.

an AV TEC lesson always centers around a script. A script is a detailed plan of everything (both visual and audio) that will constitute an AV lesson. Your AV script is important because it describes how the final product will appear in a hard copy format and thus, gives an idea of how long the finished lesson will be.

AUDIOVISUAL SCRIPT

Bibliography for 4.2.1

TPD Graphic arts guidance kit (GAGK). Fort Eustis, Virginia: U. S. Army Training Support Center - Training Programs Directorate, (no date available). (Pp. 24-25 discuss the technical aspects of animation and motion. Pp. 1-25 describe the technical aspects of semi-comprehensive art and final art.)

TRADOC PAMPHLET 350-30. ISD Phase III. Fort Monroe, Virginia: U. S. Army Training and Doctrine Command, August 1975. (Pp. 239-244 discuss stimulus time for visuals.)

Consult recent TEC Request for Proposals (RFPs) for any specific guidance that may be included for stimulus/response times.

4.2.2 AV Graphic Arts

Although the GAGK contains specific criteria for graphic arts, general technical criteria on color usage and contrast may also assist your development of AV visuals.

- USE COLOR FOR STIMULATION

- EMPHASIZE CONTRASTS FOR IMPORTANT INFORMATION

- USE GAGK FOR SPECIFIC INSTRUCTIONS ON AV LESSON DEVELOPMENT

a superiority of color presentations over black and white ones. Color does, however, seem to vitalize lesson content and to stimulate the user. On the other hand, careless use of color may destroy its value. (See GAGK for 35 mm slides of representative colors and palettes.)

Contrast. Strong contrasts should be used to emphasize important information (i.e., the main theme of a frame). Subtle contrasts are more appropriate for supplemental information. Projected slides are less fatiguing to the eye when light lettering on dark background is used.

Bibliography for 4.2.2

TPD   Graphic arts guidance kit (GAGK). Fort Eustis, Virginia: U. S. Army Training Support Center - Training Programs Directorate (no date available). (Pp. 16-20 discuss   resolution and type as they pertain to the Beseler Cue/See. Pp. 21-22 discuss   color and contrast. Examples of color usage and contrasts are provided in 35 mm and Super 8 mm.)

4.2.3   Audio Technical Considerations of AV Lessons

Synchronization, running time, and cueing can be used to assist student interaction with the Beseler Cue/See. Properly applied, these will insure ease of operation of the Beseler and thus, contribute to user acceptability.

4-42

Synchronization. Because
AV lessons are a combination of
two media, you must insure the
quality of both. Of particular
concern is the physical synchroni-
zation of the audio to the video.
The audiotape contains the in-
audible pulses to advance the
Super 8 film cartridge. There-
fore, when you review the TEC
kit in the Super 8 format you
have to verify that the pulses
do advance the video portion to
the correct frame at the correct
time.

> • SYNCHRONIZE THE NARRATION
>   TO THE VISUALS

Cueing. Normally, the
audio track automatically cues
the visual track to advance,
but the pause feature of the
Beseler Cue/See system stops
both tracks and requires manual
cueing to continue. In this
case, you have to provide,
within the script, audio di-
rections on how to proceed.
Do not assume that everyone
has used a Beseler Cue/See
before. You can provide
a general instruction at the
beginning of a lesson (e.g.,
"whenever the green light
comes on you may proceed when
you are ready") or you can
remind the student to press
the proceed button at every
stop point.

> • PROVIDE VERBAL CUEING
>   INSTRUCTIONS

AN AO TEC LESSON IS A FUNCTION OF:

1. LENGTH
   - FORMAT AND DEVELOPMENT
   - STIMULUS/RESPONSE TIME

2. TECHNICAL PROCEDURES
   - RUNNING TIME
   - CUEING

The criteria that you can apply to AO lessons under development are length, running time, and cueing. The length criteria are described in terms of format and development, and stimulus/response time. As with the audio track of AV lessons, the AO technical procedures are running time and cueing procedures.

4.3.1 AO Lesson Development

Format and Development.
Choosing the AO meduim for lesson development limits your design freedom. Because the entire lesson is in audio, lessons have to employ techniques stimulating to the auditory sense. Effective lessons will depend on the proper use of music, sound effects, voice intensity, and pacing. Audio lesssons can be especially useful as a JPA or a procedural guide which supports either an AV or PT lesson.

The development process for AO lessons requires precise and clear verbal explanation of learning objectives and learning steps. Your verbal explanations should be organized into a written script. This procedure allows you to examine everything that will be taught aurally and to edit accordingly.

AUDIO SCRIPT

			AUDIO
	FRAME NO	CUM AUDIO TIME	
		0	*Music (SFX) (SFX Out)
	1	:03	This is the second of two lessons dealing with the care and maintenance of the M109, 155mm howitzer.
	2	:09	During this portion of the lesson you will be performing a daily maintenance on the M109, 155mm howitzer. You will need a pencil, a DA Form 2404, and the Equipment Log Book for a M109, 155mm howitzer in your unit. Turn me off until you have secured these items.

Stimulus/Response Time. In AO lessons the narrative should be flowing, well paced, and integrated with review questions and practical exercises. This method will actively involve the student in the lesson and reduce boredom. Guidelines for your AO lesson length, according to a TEC RFP, are the same as the AV guidelines (See 4.2.1).

- AVERAGE KIT LENGTH: 25 MINUTES STIMULUS TIME AND 45 MINUTES OF STUDENT RESPONSE TIME

- MINIMUM KIT LENGTH: 15 MINUTES STIMULUS TIME AND 30 MINUTES OF STUDENT RESPONSE TIME

- MAXIMUM KIT LENGTH: 40 MINUTES STIMULUS TIME AND 90 MINUTES OF STUDENT RESPONSE TIME

- MODIFY ABOVE KIT LENGTHS IF NO HANDS-ON COMPONENT IS INCLUDED

Bibliography for 4.3.1

TRADOC PAMPHLET 350-30. ISD: Phase III. Fort Monroe, Virginia: U. S. Army Training and Doctrine Command, August 1975. (Pp. 230-232 discuss the development of audio only materials.)

Consult Recent TEC Request for Proposals (RFPs) for any specific guidance that may be included for stimulus/response time.

4.3.2 Audio Technical Considerations

Running Time. With AO lessons, the student has full control over the player operation. Therefore, you can have instructional material presented on both sides of the tape cassette. For ease of operation, however, you should try to limit a single kit to the running time of one side of the tape cassette (30,45, or 60 minutes per side).

Cueing. Unlike AV lessons, AO lessons do not automatically stop at cued points in the tape. You will have to insure that the audio script includes the necessary audio comments. For example, if your lesson has review questions or requests that a particular procedure be carried out, then you will have to tell

the student to turn the player
off until he is ready to pro-
ceed, e.g., "turn me off until
you are ready to go on to the
next step". In addition, if
the tape is recorded on both
sides, provide script that
directs the student to turn
the tape over, e.g., "this is
the end of side 1 of TEC
lesson xxx - xxx, turn me over
for the continuation of (lesson
title)."

4.4 PT TEC LESSON DESIGN

PT lesson development is very similar to AV lesson development. The general criteria given in Section 4.1 apply, as well as unique length criteria and graphics.

```
A PT TEC LESSON IS A FUNCTION OF:

1.  LENGTH
    - DEVELOPMENT PROCESS
    - STIMULUS/RESPONSE TIME
    - FORMAT

2.  GRAPHIC ARTS
    - COLOR
    - CONTRAST
    - PRINT AND LINE SPECIFICATIONS
```

4.4.1 PT Lesson Development

PT length is a function of the lesson development process. In particular, you should evaluate the length requirement according to the stimulus/response guidelines and use the lesson format procedures to determine how the layout will alter overall lesson length.

4.4 :

- DEVELOP PT LESSONS LIKE AV LESSONS

- RELY HEAVILY ON VISUALS TO CONVEY THE LESSON INFORMATION

A VISUAL DUMMY

FRONT SIDE · REVERSE SIDE

8 3/4"

6 9/16"   3/4"
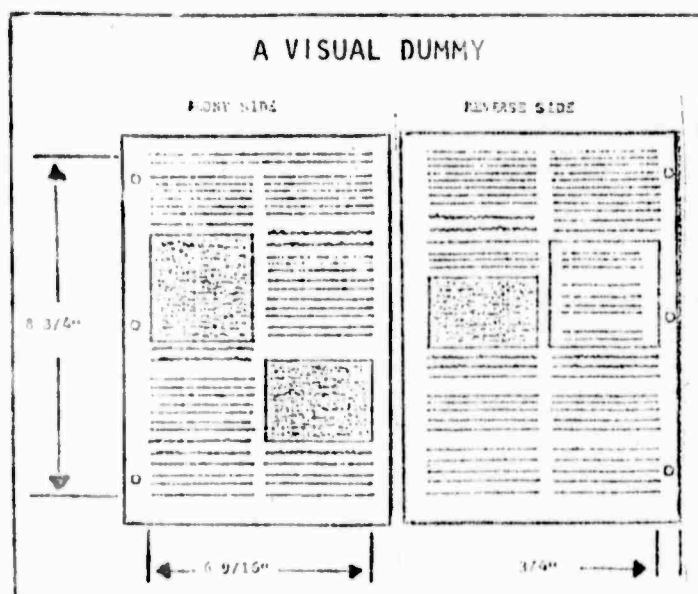
Lesson Development Process.
PT lesson development should parallel the AV lesson development process. A manuscript is composed from the CCSS. From the manuscript, a visual dummy (comparable to the storyboard in the AV lesson development process) of print and visuals is developed. The final stage is the camera-ready copy or master mechanical which is developed from the visual dummy. The GAGK provides complete instrutions for developing a master mechanical.

Care should be taken in deciding to use PT lessons in any particular MOS because some soldiers may have difficulty understanding printed material. You should emphasize the pictorial component rather than the verbal component.

Stimilus/Response Time. PT lesson construction should parallel AV lesson construction. In fact, a PT lesson may be an exact hard copy of an AV lesson, i.e., extensive visuals with the accompanying printed narration. Because PT lessons are completely self-paced, exercise caution when deciding on overall length; the length is a function of individual reading speed (average reading speed for the U. S. adult is 200-300 words per minute) and study time of the accompanying visual

4-48

Lesson Format. The critical factor in preparing PT lessons is page layout. Based on the guidelines from a human factors handbook, the user of the lesson visually enters each page at the upper left-hand corner. Therefore, attention should be focused on the reader's interest point, _e.g._, using an attention-getting lead-off visual to direct the reader through the material.

PAGE LAYOUT*

SUBJECT

TEXT

ILLUSTRATION
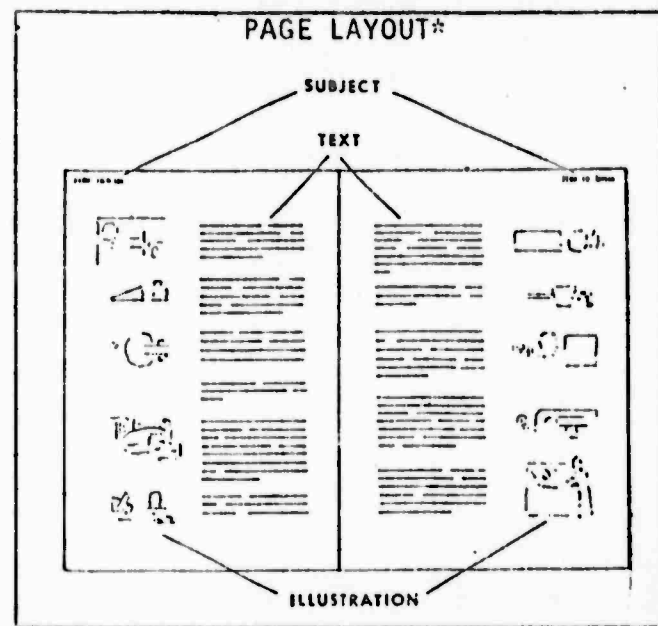
TWO TYPICAL PT FRAMES FROM TEC LESSONS
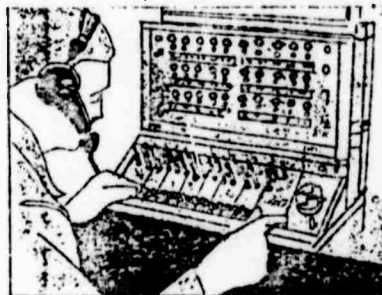
Put on and connect the head-set and take a good operating position.

Number of Hours is NOT Important
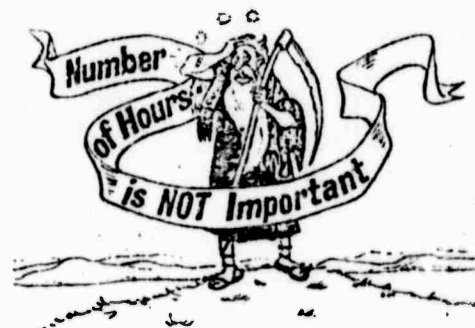
In fact, whether you belong to an Active Army or Reserve Component unit, the number of hours of training is not important. What is important is -- can the soldier or the unit do the job? This means concentrating your training on critical tasks which right now your soldiers cannot perform, or skills they need now which they do not have.

---

* Adapted from Woodson & Conover, 1970.

4-49

Bibliography for 4.4.1

TPD   Graphic arts guidance kit (GAGK). Fort Eustis, Virginia: U. S.
      Army Training Support Center - Training Programs Directorate (no
      date available). (Pp. 29-31 discuss technical guidelines for
      printed texts.)

Woodson, W. E. & Conover, D. W. Human engineering guide for equipment
      designers (2nd ed.). Berkeley, California: University of California
      Press, 1970. (Contains a section on formatting printed material.)

4.4.2 PT Graphic Arts

Graphic arts for PT lessons can be evaluated in terms of color usage, contrast and print/line specifications.

Color Usage. ((The criteria presented for AV lessons are appropriate. See sections 4.1.3, 4.2.2, and GAGK for specific guidance)).

Contrast. Most of the time, PT lessons will use a black and white medium. Therefore, your use of contrast will be important for conveying the lesson objectives.

- USE DARK PRINT ON LIGHT BACK-
  GROUND

- USE BLACK PRINT ON HIGHLY RE-
  FLECTING BUT NON-GLOSSY WHITE
  PAPER

- USE PAPER OF SUFFICIENT WEIGHT
  TO AVOID BLEED-THROUGH OF PRINT
  FROM THE OPPOSITE SIDE OF PAGE

The following table presents detailed
recommendations for designing printed
material (Woodson & Conover, 1970):

PRINT STYLE Vertical (roman) print is recommended for normal use. Italics ore permissible for special emphasis, but should be used sparingly.	Bookman Old Style Garamond Cheltenham Antique Scotch Roman (Styles under labels, etc., can also be used for headings, graphs, tables, etc.)
PRINT FORM	Combinations of copital and lower-case letters
PRINT SIZE	10-point type preferred; 9 to 12 points permissible. (1 point == 0.0138 inch.)
LINE LENGTH	19 picas preferred; 14 to 28 picas permissible. (1 pica == 0.166 inch)
LINE SPACING	With 10-point type, space between lines should not be less than 2 points.

Bibliography for 4.4.2

TPD   Graphic arts guidance kit (GAGK). Fort Eustis, Virginia: U. S.
      Army Training Support Center - Training Programs Directorate, (no
      date available). (Pp. 21-22 discuss color usage and contrast.)

Woodson, W. E. & Conover, D. W. Human engineering guide for equipment
      designers (2nd ed.) Berkeley, California: University of California
      Press, 1970. (Contains guidelines for print and line specifications.)

Presently TEC JPAs are only developed in one medium, print; although all media are likely candidates. The main consideration is deciding when a JPA is appropriate.

4.5.1 The Appropriateness of a JPA

USE JPAs FOR:

- BEHAVIOR SEQUENCES THAT ARE LONG AND COMPLEX

- TASKS THAT ARE RARELY PERFORMED

- TASKS THAT INVOLVE READINGS AND TOLERANCES

- TASKS THAT ARE AIDED BY THE PRESENCE OF ILLUSTRATIONS

- TASKS THAT UTILIZE REFERENCE INFORMATION, SUCH AS TABLES, GRAPHS, FLOWCHARTS, AND SCHEMATICS

Definition and Use. A JPA is any device which permits an individual to perform a task he would not normally be able to do without extensive training or complex problem solving. A JPA can be a set of procedures, charts, tables of data, or checklists (the most common).

A specialized use of a JPA is the checklist which directs the individual through the major steps of a particular procedure. When used as part of an existing TEC lesson the checklist is not issued as a separate TEC lesson. Rather, it supports the TEC lesson and serves as a reminder. The independent TEC JPA is a TEC lesson and contains all the information needed to perform particular tasks. Although usually in a printed-pictorial format, you can also construct JPAs in the AO and AV media. Research has shown the printed pictorial format to be the most cost-effective medium, but, the task itself determines the medium. For example, a procedure that requires hands-on operation (e.g., preparing to swim a tank) can be performed with an AO checklist. The cassette player is attached to the student's belt and the ear phone is placed in his ear. This leaves a student's hands free to perform all needed procedures.

4-52

CONVENTIONAL JPA

LESSON NO. 936-061-0137-1
TA-312 : LB OPERATION

Remove Handset

◄ PUSH TO REMOVE

Set The 3 Switches and Install Batteries

LB (use dime)
INT   LOUD

Test Batteries and Handset

1. Close battery cover
2. Press switch on side of handset
3. Say into handset "TEST-TEST"
4. If you do not hear yourself, install new batteries
5. If still not working, tell supervisor

SPECIALIZED CHECKLIST

PERFORM THE TUNING PROCEDURE
ON BATT SET AN/GRC-142(*)

a. Set SERVICE SELECTOR switch to STANDBY. Allow 90 seconds for warmup. Observe that blowers are energized and the SIGNAL LEVEL METER indicates in the extreme right portion of the scale.

b. Set SERVICE SELECTOR switch to SSB-NSK. Signal level meter returns to extreme left portion of meter scale.

c. Observe that TEST METER indicates PRIM VOLT reading.

d. Obtain frequency from CEOI and preset the MHz and KHz controls.

e. Select start settings for ANT TUNE and ANT LOAD counters and adjust the ANT TUNE and ANT LOAD controls until the counters indicates the settings.

f. Set HV RESET switch to TUNE.

g. Observe that one or both of the pointers are off center scale on the ANT TUNE and ANT LOAD meters.

h. Adjust ANT LOAD and ANT TUNE meters for simultaneous center scale reading. Observe 2 minute caution while adjusting.

i. Set TEST METER switch to LOW VOLT, HIGH VOLT and DRIVER CUR. TEST METER indicates within area of top scale.

j. Set TEST METER switch to GRID DRIVE, PA CUR, and POWER OUT. TEST METER indicates just below gray area of scale.

k. Set HV RESET switch to OPERATE. TEST METER indicates extreme left area of scale.

The final consideration is the availability of the JPA. The printed medium permits unlimited distribution. The JPAs can be given to every soldier that needs one and/or the JPA can be packed with the equipment. Employment of either the AO or AV medium do not afford you this flexibility.

- VERIFY ACTIVITY STEPS

- GROUP STEPS INTO UNITS

- PRODUCE JPA

you decide that a JPA is needed, determine all the steps of the procedure that a novice would need to know. Keep the activities simple; compound activities can lead to confusion. Next, group the activity steps into small manageable units. For example, if nine steps are required to checkout a radio, group all nine into one activity. Finally, produce the JPA according to the media guidelines mentioned earlier.

Bibliography for 4.5.1

TRADOC PAMPHLET 350-30. ISD: Phase III. Fort Monroe, Virginia: U. S. Army Training and Doctrine Command, August 1975. (Pp. 252-257 contain a description and examples of job performance aids.)

Joyce, R. P., Chenzoff, A. P., Mulligan, J. F., & Mallory, W. T. Fully proceduralized job performance aids: Handbook for JPA developers (AFHRL-TR-73-43). Wright-Patterson Air Force Base, Ohio: U. S. Air Force Human Resources Laboratory, December 1973. (Contains a good description of how effective JPAs can be developed.)

4.5.2 JPA Technical Procedures

Decide on the appropriate medium for the JPA. Then consult the previous sections of this chapter for the technical procedures which are appropriate.

4-54

Sections 4.1 to 4.5 gave you the
human factors criteria to use in order
to develop TEC lessons. This section
provides some sample checklists based
on those criteria which can be used
to assess the quality of a TEC lesson
at various stages of development.
These checklists can be used to assess
a contractor's lesson development as
well as your own in-house efforts.
These, or similar devices, should be
applied to all lessons and negative
findings should be corrected. Al-
though the ultimate responsibility
for assessing lesson quality rests
with the Naval Training Equipment
Center (NTEC), you should assist
in the quality check by assessing
lesson design quality at all review
points from the initial draft to
final approval of the preproduction
sample.

4.6.1 Review and Revision of the Initial Draft

After the first draft of a
TEC lesson has been developed (either
in-house or under contract), you
should review the lesson for com-
pleteness and accuracy. Doctrinal
accuracy should be reviewed by
school experts (i.e., SMEs) and
completeness of script according
to the lesson outline (Kit Design
Approach, if under contract) by
school TEC project officers.

You should use this review
to determine what you want the
final product to look like. Docu-
ment all discrepancies because
a failure to validate may be
a result of poor design. This
record will help you decide what

4-55

validate the lesson. Generally, non-rejection of poor kit design will lead to validation problems and to the possible acceptance of a poorly designed TEC lesson.

To assist you in assessing TEC lesson quality at the initial draft, two checklists are provided, One, the "TEC Script/ Manuscript Evaluation Instrument" (developed by the Combat Arms Training Board - CATB), is useful in determining the completeness of the lesson and in determining the responsibility for errors.

TEC SCRIPT*/MANUSCRIPT EVALUATION INSTRUMENT

Kit Title:_____

Kit No:_____

_____ Date:_____

Reviewer_____

PURPOSE: This instrument is designed to be used as a guide in reviewing 1st draft script. It is designed to be used by personnel who have the responsibility of insuring that a lesson is achieving its objectives. This instrument, once filled out, is to become part of the historical file for each lesson.

INSTRUCTIONS:

1. Place a copy of the script as received from Contractor in the historical file. Place a date on the script when received from Contractor.

2. Read over this instrument so you become familiar with the information required.

3. Materials required for 1st Draft Script Review:

   a. CCSS

   b. LCA

   c. KDA

   d. KDA Revisions

4. As you review each section of the script, rate the section using the criteria described below. If an item has been met, place an "X" in the "Yes" column. If you feel that the item has not been met, "X" the "No" column and so on. Explain all "No" and "Cannot Determine" responses at the end of this instrument.

5. Read the script over once without stopping so as to get an overview, then review script so as to answer all the items.

*Throughout this instrument, script will be synonymous for script/manuscript, whichever is appropriate.

1.0 Administrative

	YES	NO	CANNOT DETERMINE	N/A

1.1 Has each page of the script been identified with a page number and lesson number?

1.2 Has a plot been submitted for approval prior to delivery of Storyboards (AV), Scratch Tape (AO)?

1.3 Does the kit present an appropriate amount of material?

2.0 Body of Script

	YES	NO	CANNOT DETERMINE	N/A

2.1 Is Contractor following KDA outline?

2.2 Have the school's changes to Contractor's KDA been incorporated into script?

2.3 Is the relationship (part of; prerequisite) with other TEC lessons stated in the beginning of the lesson?

2.4 Does the kit begin with a brief introduction that tells the soldier what the kit is about (overview)?

2.5 In the beginning of the lesson, is the soldier told what equipment will be required to take the kit?

2.6 Is the soldier told in the beginning what he will be able to do as a result of completing the kit (i.e., are objectives clearly defined)?

2.7 Does the kit contain words and phrases that will be understood by the target audience?

2.8 Is the sequencing or chaining of behaviors appropriate to learning the objectives?

2.9 Does the kit provide the soldier with conditions (problem cues, situations, tool requirements, criterion cues) and where appropriate standards for accuracy and speed which have job fidelity?

4-57

YES   NO   CANNOT DETERMINE   N/A

2.10 Are new or technical terms explained?

2.11 Is there sufficient repetition of new terms?

2.12 Are abbreviations explained?

2.13 Is the creative approach to the lesson (humor - music - dramatic situation - animated motion) job related?

2.14 Is the kit interactive? Is the soldier getting involved early in the lesson?

2.15 During practice exercises, is the soldier told either to think the answers, write them out, or actually perform them?

2.16 Does the lesson contain a cummulative self-evaluation criterion test, which reflects what the soldier is to do as a result of the lesson?

2.17 Does the lesson provide for immediate knowledge of results (confirmation of correct performance)?

2.18 Does the criterion test provide realism?

2.19 Is there a precise match between the criterion referenced test and the task (objective)?

2.20 Does lesson provide a tight fit of visual sequence to narrative?

2.21 Has each visual callout (AV), or visual dummy (PT) been reviewed?

YES   NO   CANNOT DETERMINE   N/A

2.22 Is each visual callout or visual dummy appropriate with its script?

2.23 Is each visual callout understandable?

2.24 Is each visual callout technically correct?

2.25 Are there any callouts which would indicate the contractor might be planning on using artwork more sophisticated than necessary?

1.0 Action Required

YES   NO   CANNOT DETERMINE   N/A

1.1 Does the letter to the contractor contain the following information:

a. Approval/disapproval for a particular kit?

b. Recommended corrections, deletions, or additions to the script and callouts identified by frame number?

c. Corrections, deletions, or additions to the script and visual callouts that must be made because they are technically and/or doctrinally incorrect, identified by frame number?

d. Information the contractor needs to make corrections, deletions, or additions?

e. "No" responses on the Script Evaluation Instrument identified and explained to the contractor?

f. Instructions for the contractor on how words and numbers are pronounced in the military that are pronounced differently by civilians?

The second checklist, the "Human
Factors Criteria Checklist", is
based on the human factors criteria
given in Sections 4.1 - 4.5. Based
on these criteria you can use this
checklist to determine if the design
is acceptable. The analysis of "no"
answers will lead to an improved
design.

HUMAN FACTORS CRITERIA CHECKLIST   Yes   No

1. If the TEC kit is part of a larger lesson or lesson series, is its content compatible with fielded TEC lessons (e.g., the contents of each related kit should be equal in level of difficulty and should not overlap)? . . . .

2. If the TEC kit is in a different medium/mode than previous kits, is it still a logical part of the total lesson or lesson series? . . . .

3. If the TEC kit is part of a larger lesson or lesson series, is its content compatible with planned TEC lessons? . . . .

4. If the TEC kit is in a different medium/mode than planned kits, is it still a logical part of the total lesson or lesson series? . . . .

5. What is the approximate total narration/response time? _____

   a) If it contains no hands-on or practical exercise component is it less than 30 minutes? . . . . . .

   b) If it contains a hands-on or practical exercise component is it less than 110 minutes? . . . . .

   c) Is all the response time critical to learning kit objectives? . . . .

6. Is the level of the narrated material near the reading/comprehension level of the target audience? (This is critical if a PT medium is used) . . . .

7. Is there enough quiz material to review the kit objectives? . . . .

8. Do the review questions reflect specific kit objectives? . . . .

9. Does the TEC kit have a visual track? _____ (If the answer is "yes" answer items 9a - 9k, otherwise, go on to item 10.)

   a) Are there enough visuals to illustrate the kit objectives? . . . .

   b) Are animated and motion sequences used in appropriate places? . . . .

   c) Are the visuals acceptable in terms of current doctrine? (Applies to AV kit only). . . . . . .

   d) Is the level of detail acceptable in terms of current detail you want and/or need. The more costly, both in development time and money, the more costly, both The longer you put off an acceptable kit will be. decision, the harder it will be to change a visual. Therefore, if you want specific detail, require it now.) . . . .

   e) Are harmonious colors used? . . . .

   f) Do the contrasts conform to the established criteria? . . . .

   g) Do the print and line specifications conform to the established criteria? . . . .

10. Does the TEC kit contain an audio track? . . . . . answer items 10a - 10b, otherwise go on to item 11.)

   a) Is the running time of the kit less than the running time of a tape cassette? . . . .

   b) Are cueing procedures included as part of the script? . . . .

11. If the TEC kit is a JPA:

   a) Is it used for a task or procedure that should be supported with a JPA? . . . .

   b) Is it in the appropriate medium (e.g., if the student is required to have full use of both hands throughout the task or procedure, PT would not be appropriate medium)? . . . .

All noted problems should be
corrected (by the contractor if it
is a contractor effort; by the
school if it is an in-house effort).
Once revisions are made, you
should review those revisions to
insure that acceptable changes
have been made.

4.6.2 Review and Revision of the Final Draft

The final draft should
incorporate the revisions
and corrections drawn from in-
dividual trials, small group
trials, large group trials,
and your own prior application of
the checklists and questionnaires.
This review is your last chance to
change the lesson before production
of the master materials (master
tapes, master art, camera-ready
mechanicals, etc.).

Assess the quality of this
draft the same way you reviewed
the initial draft, using the
two checklists given in Section
4.6.1. In addition, check to
see that all visuals are in the
correct order and that all visuals
match up with a corresponding nar-
ration on the script or visual
dummy. All problems should be
corrected (by contractor if it is
a contractor effort; by the school
if it is an in-house effort) before
preparation of the master materials.

An additional consideration
for assessing the quality of TEC
lessons is user acceptability. De-
signing a lesson that is not disliked

- REVIEW THE FINAL DRAFT THE
  SAME AS THE INITIAL DRAFT

- CHECK SEQUENCE OF VISUALS

- CHECK RELATIONSHIPS OF
  VISUALS TO NARRATION

is half the battle. The soldiers you use for indivdual trials, small group trials, and large group trials can also provide information relating to user acceptability.

One means of obtaining the information is to use a simple checklist questionnaire similar to the one below. Following up the "no" answers should provide you with additional information for insuring an effective TEC lesson.

USER EVALUATION	Yes	No
1. Was the lesson interesting?	___	___
2. Was the information useful?	___	___
3. To the best of your knowledge was the information accurate?	___	___
4. Did you have trouble understanding some of the words used in the lesson?.	___	___
5. Is this lesson pertinent to your Army career?.	___	___
6. Were the lesson objectives clear?	___	___
7. Was the lesson well organized?.	___	___
8. Was the lesson too difficult?	___	___
9. Was the lesson too long?.	___	___
10. If the lesson required practical exercises to learn the objectives, were there enough?	___	___
11. Did the lesson provide enough review questions?.	___	___
12. If the lesson contained illustrations:		
a) Were they interesting?.	___	___
b) To the best of your knowledge, were they technically correct?	___	___
c) Was their meaning clear?	___	___
13. If the lesson contained an audio recording:		
a) Was it paced slow enough?	___	___
b) Was the narrator's voice pleasant?.	___	___
c) Could you understand the narrator?.	___	___

4.6.3 Inspection of the Master Kit

The Master Kit is the complete TEC kit/lesson prepared for mass production. This final review affords the opportunity of previewing exactly what will be placed in the final product.

Again, use the checklists given in Section 4.6.1 to assist in your review. Remember, though, make technical changes not preferential changes. This is not the time to decide that the sky is not blue enough or that wind is bending the grass the wrong way.

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● REVIEW MASTER KIT USING
  PREVIOUS CHECKLISTS

● CHECK FOR COMPLETENESS
  AND ACCURACY
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Examine the total kit (audio and visual simultaneously for AV lessons) to assure it is correct and complete. Because you are viewing 35 mm copies of the final art, you may not be able to detect all the minor mistakes that will cause projection distortions. Don't worry, because the NTEC Project Engineer (PE) will review the master for technical quality. NTEC will also check to see that all components of the Master Kit are in compliance with the specifications of the applicable contract. Thus, you should concentrate on technical content, and forward all comments to the NTEC PE.

4.6.4 Review of the Preproduction Sample

This is the last time you will see the kit before mass distribution; once approved, copies will be made. Again, you should scrutinize the kit using the checklists previously provided. Although you are not expected to assess the quality (e.g., exposure, positive dirt, etc.), do comment on all problems that you can detect and forward your comments to NTEC for final approval.

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● REVIEW PREPRODUCTION SAMPLE
  FOR COMPLETENESS AND ACCURACY
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CONTENTS

TEC VALIDATION

• IN-HOUSE EVALUATION

   - PRE- AND POSTTEST DEVELOPMENT

   - INDIVIDUAL TRIAL

   - SMALL GROUP TRIAL

   - EFFECTIVENESS TESTING

   - SCORING AND LESSON VALIDATION

• CONTRACT LESSON EVALUATION

This chapter has two uses. First, it is designed to aid you in evaluating TEC lessons developed in-house. Second, the chapter is to be used in conjunction with TEC contract specifications when monitoring the evaluation of lessons developed under contract.

Section 5.1 discusses the TEC lesson evaluation process and provides needed background for understanding the finer points of that process while Sections 5.1.1 through 5.1.5 define the five phases in the TEC lesson evaluation process, viz., pre- and posttest development, individual trials, small group trials (optional), evaluation test, and the validation decision. Section 5.2 provides a description of your role in monitoring TEC lessons developed under contract and presents information relative to minimizing errors during evaluation testing.

The TEC lesson validation process is a training effectiveness evaluation. The iterative process of lesson development and the subsequent testing of instruction are creating, through trial and revision, training effective TEC lessons for job relevant tasks.

The purpose of TEC lesson evaluation is to demonstrate the training effectiveness of a given TEC lesson at each stage of development. The weaknesses are identified that can be strengthened by modifying any combination of the lesson's content, visuals, or sound track. Once modified, the lesson is evaluated again. In a sense, the process resembles the method of adjusting artillery fire by the bracketing process. Fire, and adjust; fire, and adjust. The process is repeated until the target is hit and then there is fire for effect. A TEC lesson is tried on members of the target population until it works. That is, until the trainees achieve the learning objectives. Then the lesson is ready to be packaged and distributed for "Training For Effect."

The training effectiveness evaluation, (shown below) if properly conducted, will ensure that the instruction teaches, i.e., a majority of the target audience will achieve established learning objectives at a specified criterion level.

THE TRAINING EFFECTIVENESS EVALUATION PROCESS

A PROVEN EFFECTIVE
TEC LESSON

OPPORTUNITY FOR ERROR
RESULTING FROM IN-
APPROPRIATE INSTRUCTION
REDUCED THRU APPLICA-
TION OF THE TEC LESSON.
EVALUATION PROCESS.

ITERATIVE TESTING OF
LESSON EFFECTIVENESS
OR "VALIDATION"

TRANSLATE TRAINING OBJECTIVES
INTO TEC LESSONS FOR USE BY
TRAINEES

OPPORTUNITY FOR ERROR
REDUCED THRU APPLI-
CATION OF FORMAL
VALIDATION TECHNIQUES.

DEVELOP PRE- AND POSTTESTS TO
BE USED TO MEASURE TRAINING
EFFECTIVENESS

TRAINING NEED REPRESENTED IN
TERMS OF TRAINING OBJECTIVES

REAL WORLD TRAINING NEED

POTENTIAL WEAKNESS
STILL EXISTS

5-4

will also be able to perform the
required soldiers' tasks at a
criterion level.

The training objectives for a
TEC lesson are usually provided to
the TEC Manager by other elements of
the TRADOC school. (If training
objectives are not provided, you have
to develop them.) These objectives
are derived directly from complete
task analyses of soldiers' jobs.
Nevertheless, you are responsible
for verifying the validity of the
training objectives. At the mini-
mum, your SMEs should carefully
assess the content validity of all
training objectives. Content
validity can be established by
systematically checking that
objectives have been derived from
an analysis of what the soldier
must know and/or do in order to
perform the task to be taught in
the TEC lesson.

The training effectiveness
of a lesson is measured in terms
of the pre- and posttest accompany-
ing it. The difference in post-
test scores over pretest scores is
a direct measure of how well the
lesson trains. Pre- and posttests
have to be validated to insure they
are measuring what is intended to
be measured. This will lead to
reduced error in testing and lesson
development and to increased effect-
iveness of TEC lessons. Methods for
validation of the pre- and posttest
are presented in the "Developing a
Valid Test" section.

THE SUCCESS OF THE INSTRUCT-
IONAL DEVELOPMENT PROCESS IS
BASED ON TWO ASSUMPTIONS:

- THE TRAINING OBJECTIVES
  ARE VALID

- THE CRITERION REFERENCED
  TEST ITEMS USED IN THE
  PRE- AND POSTTESTS IN THE
  EFFECTIVENESS EVALUATION
  ARE VALID

THE FIVE PHASES OF THE TEC
LESSON EVALUATION PROCESS:

- PRE- AND POSTTEST DEVELOP-
  MENT PHASE

- INDIVIDUAL TRIAL PHASE

- SMALL GROUP TRIAL PHASE
  (OPTIONAL)

- EFFECTIVENESS TESTING PHASE
  (LARGE GROUP PHASE)

- VALIDATION DECISION-MAKING
  PHASE

Your responsibility as a TEC lesson
evaluator begins in the stage where
training objectives are translated into
performance to be measured by criterion-
referenced test items. For example,
the training objective - field strip
an M16A1 rifle in total darkness within
5 minutes - is measured by criterion-
referenced and performance test items
that record the GO - NO GO of the
field stripping and the time required
to perform it.

In the TEC lesson development proce
the criterion-referenced test items are
developed prior to the design of the
lesson itself. These test items are
incorporated into the pre- and post-
tests. Without a valid test to measure
training effectiveness of a lesson, you
cannot know when you have a valid lesson.

Although the pre- and the posttest
are usually the same test, you may pre-
fer to have the posttest differ from
the pretest in some situations. You
must be absolutely sure, however, that
the test items in the two tests measure
the same training objectives. Pre-
and posttests may be one or a combination
of two types of tests: a paper-and-
pencil test or a performance test. If
you do not incorporate a performance
component into the pre- and the post-
tests, you should include a performance
test in addition to the pre- and post-
tests for the purpose of evaluating
training effectiveness.

Validity and Reliability. Test
construction, like lesson development,
is an iterative process of trial and
error. It begins with the selection of
a large pool of test items - either
performance items or written items -
which are related to the performance
objectives. Next, you must examine,

> EVALUATE TRAINING EFFECTIVENESS
> WITH
>
> • PRETEST
>
> • POSTTEST
>
> • PERFORMANCE TEST

construct the test and invalid ones
are discarded.

Validity and reliability are
the two elements which describe
the utility and accuracy of a test.
Validity is the most important aspect
of any type of test. The validity
of a test is defined as the degree
to which a test measures the perform-
ance it was designed to measure.

The reliability of a test is
defined as the consistency of the
measure. That means only that the
test, no matter what it is measuring,
will produce the same value (score)
or one very close, every time a
person takes the test. To evaluate
TEC training effectiveness of the
lesson, the test must be dependable.
But, that is not enough; it may
measure consistently, and still not
be valid, i.e., measure what is
intended to measure. Tests used
for TEC lessons must be both
reliable and valid. They must
consistently measure the effective-
ness of the lesson with respect to
the soldiers' real performance
requirements.

Developing a Valid Test. One
can only estimate the validity of
a test. But, there are known
techniques to use in developing a
valid test.

To determine item content
validity you must examine the
initial pool of test items on an
item by item basis to see if each

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TESTS MUST BE

  • VALID

  • RELIABLE
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VALID TESTS COMPRISE

  • ITEM CONTENT VALIDATION

  • EMPIRICAL ITEM VALIDATION
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appears to measure what it was intended
to measure. The examination should
involve two steps:

- Making systematic comparisons be-
  tween training objectives and the
  test items designed to measure those
  objectives (For greater detail See
  Swezey and Pearlstein, 1975).

- Having SMEs review the objectives
  plus the test items developed
  to measure them.

The SME review should result in necessary
revisions of the test items with respect
to required tasks, applicable conditions,
and scoring standards. The review should
also examine administrative feasibility
and define the standardized testing con-
ditions. This process should produce
content-valid test items which are
usable for the test.

Test items should then be empir-
ically validated through testing the
performance of two groups of subjects.
One group should be experts (Masters)
in the performance requirement the
lesson is to support. The other group
should be novices (Non-masters).
Candidate Masters and Non-masters should
be identified by school personnel. The
candidates should be identified either
by skill levels, by rank, or preferably
by sound judgments of individual job
performance capability. For this
analysis to be effective, you must be
sure that the Masters have truly mastered
the required skills. Select your sub-
jects using the sampling procedures
discussed in Section 5.1.4. After
selection, administer the criterion-
referenced test items to both groups.
Remember, the lesson itself is not
involved in the test validation process;
your concern is only with the test
items and the performance requirements.

After you have administered
the test and collected the data,
submit the data to analysis using
the Phi coefficient (shown below).
The Phi coefficient is used to
identify those items which are
valid measures of job proficiency.
Test items which discriminate
between Masters and Non-masters
are considered to be valid (i.e.,
valid items are those which most
Masters pass and most Non-masters
fail). Valid items will then be
included in the test. Items that do
not discriminate consistently are
invalid and should be eliminated
from the test. The test may have
to be revised and examined several
times before it can be considered
valid.

USE OF THE PHI COEFFICIENT TO ESTABLISH

EMPIRICAL ITEM VALIDATION*

1. ϕ is best used when items are scored pass-fail, go - no go, acceptable-unacceptable, or 1-0, and when there are about the same number of persons in the "Masters" and "Non-Masters" groups.

2. To compute ϕ for an item, determine:

    A. How many "Masters" passed the item
    B. How many "Masters" failed the item
    C. How many "Non-Masters" passed the item
    D. How many "Non-Masters" failed the item

3. Fill in the information determined above in a table such as this one (and make the additions indicated in the right and bottom margins of the table):

Item

	Fail	Pass	
"Masters"	B	A	A+B
"Non-Masters"	D	C	C+D
	B+D	A+C	

4. Calculate ϕ by substituting the values from the table into this formula:

$$\phi = \frac{AD-BC}{\sqrt{(A+B)(C+D)(A+C)(B+D)}}$$

5. If the value of ϕ for an item is less than +.30, consider it a "Warning Flag" for that item: Pay careful attention to the item because it may be a poor one - it is often better to throw out that item, develop a new one and try it out.

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*Swezey and Pearlstein, 1975.

5-10

Remember, if any test item is determined to be invalid, you must reject it or redesign it and submit it to the same test development process. Repeat the procedure using different students until you have an empirically valid test. Once you have determined that a test is valid, you should examine its reliability.

Establishing a Reliable Test. There are many methods which may be used to estimate a test's reliability. The split-half method (given below) divides a test into two half-length tests. These half tests are scored, correlated, and used in an additional calculation to estimate the reliability of the test.

The test items should be split so that one or more items related to each training objective falls into each half of the test. This will make the two halves more rationally equivalent. If there are not at least two items for a given training objective, try to match the item by placing an item for a related training objective in the second half-test. Now, number these items in one test with even integers and those in the other with odd integers, and then combine all of the items into one overall test. Administer the test as though it had never been split. Score the test to produce two separate scores - one for the odd numbered items and one for the even numbered items. Keep the two scores for each student's test together; they are the "matched pair" scores you will correlate.

To correlate the scores, you will have to compute r, a correlation coefficient, by the method given below.

TO DETERMINE RELIABILITY

• SPLIT TEST IN HALF

• SCORE EACH HALF

• CORRELATE SCORES

• USE CORRELATION OF SCORES FOR ESTIMATING RELIABILITY

CORRELATING TEST SCORES - AN EXAMPLE

Student	Scores on Odd Items (X)	Scores on Even Items (Y)	X^2	Y^2	XY
1	8	3	64	9	24
2	2	1	4	1	2
3	8	6	64	36	48
4	5	3	25	9	15
5	15	14	225	196	210
6	11	12	121	144	132
7	13	9	169	81	117
8	6	4	36	16	24
9	4	4	16	16	16
10	6	5	36	25	30
n=10	$\Sigma X=78$	$\Sigma Y=61$	$\Sigma X^2=760$	$\Sigma Y^2=533$	$\Sigma XY=618$

Next, substitute your data into the formula.

$$r = \frac{\Sigma XY - \frac{(\Sigma X)(\Sigma Y)}{n}}{\sqrt{\left(\Sigma X^2 - \frac{(\Sigma X)^2}{n}\right)\left(\Sigma Y^2 - \frac{(\Sigma Y)^2}{n}\right)}}$$

The above example data yield:

$$r = \frac{618 - \frac{(78)(61)}{10}}{\sqrt{\left(760 - \frac{(79)^2}{10}\right)\left(533 - \frac{(61)^2}{10}\right)}}$$

$$= \frac{142.2}{156.2}$$

$$= 0.91$$

Finally, to arrive at your goal of
a reliability estimate, you will have
to compute $\hat{r}$ by the method given below.

COMPUTING $\hat{r}$

$$\hat{r} = \frac{2r}{1+r}$$

Where:

   $\hat{r}$ = the estimated reliability of the
      full length test

   r = the correlation coefficient between
      the even scores and the odd scores

EXAMPLE:

   Using $r = 0.91$

   $\hat{r} = \frac{2(0.91)}{1+(0.91)} = \frac{(1.82)}{(1.91)} = 0.953$

You should be aware that the value
of $\hat{r}$ can range from -1.00 through zero
to $+1.00$. If the value of $\hat{r}$ is less
than $+0.60$ or is negative, the test has
questionable reliability. Therefore,
regard values between $+0.60$ and -1.00
as a warning flag and consider the
alternatives given below.

QUESTIONABLE RELIABILITY ALTERNATIVES:

- CHECK ALL FIGURES FOR ERRORS.

- CHECK EACH HALF-LENGTH TEST FOR EQUIVALENT ITEMS, i.e., EACH ITEM IN THE EVEN PART OF THE REST HAS TO HAVE AN "EQUIVALENT" ITEM IN THE ODD PART OF THE TEST.

- CHECK THE VALIDATION PROCEDURE FOR BOTH ITEM CONTENT VALIDATION AND EMPIRICAL ITEM VALIDATION.

- ADD EQUIVALENT ITEMS THAT CORRESPOND TO THE LESSON OBJECTIVES TO EACH HALF-LENGTH TEST. ADDING ITEMS OFTEN INCREASES THE RELIABILITY OF A TEST.

- IF NO WEAKNESSES CAN BE DETECTED AND ADDITIONAL ITEMS DO NOT HELP, YOU WILL HAVE TO DEVELOP NEW ITEMS AND MODIFY THE TEST UNTIL IT IS BOTH VALID AND RELIABLE.

Bibliography for 5.1.1

Swezey, R. W. and Pearlstein, R. B. Guidebook for developing criterion-referenced tests. Arlington, Virginia: U. S. Army Research Institute for the Behavioral and Social Sciences, August 1975. (AD - A014 487) (Pp. 5-1 to 5-15 and 7-6 to 7-12 provide information on test validity and reliability. Also, the use of the Phi coefficient is demonstrated.)

TRADOC PAMPHLET 350-30. ISD Phase III. Fort Monroe, Virginia: U. S. Army Training and Doctrine Command, August 1975. (Pp. 280-336 discuss validation and present procedures to follow for conducting a lesson validation.)

TRADOC PAMPHLET 350-31. (Draft) Preparing extension training. Fort Monroe, Virginia: U. S. Army Training and Doctrine Command, February 1976. (Pp. 55-59 discuss the validation of nonresident instruction.)

5.1.2 Individual Trial Phase

You need to prepare for and conduct individual trials with great care. The results of these trials will point out weaknesses in your lesson for revision and help you decide when to proceed to full validation trials.

Individual trials are conducted during the development of a master TEC lesson, i.e., the storyboard or a sound/slide format. The trials must test all of the lesson materials, the tests, the instructional materials, models, etc. Everything required to implement the lesson must be evaluated. In preparing for the individual trial, you must consider the eight requirements given below.

AN INDIVIDUAL TRIAL IS

- CONDUCTED BY TRYING INSTRUCTIONAL MATERIALS INDIVIDUALLY ON 3 TO 5 STUDENTS REPRESENTATIVE OF THE TARGET POPULATION.

- CONDUCTED FOR THE PURPOSE OF IDENTIFYING THOSE AREAS WITHIN THE LESSON SUBJECT KIT WHICH REQUIRE REVISION TO INSURE INSTRUCTIONAL EFFECTIVENESS.

PREPARING FOR THE INDIVIDUAL TRIAL:

- IDENTIFY AND PROVIDE THE EQUIPMENT REQUIRED TO CONDUCT THE TRIALS; i.e., 35 MM PROJECTORS, AUDIO EQUIPMENT, MATERIALS, AND ANY MILITARY EQUIPMENT NECESSARY FOR PERFORMANCE TESTING.

- INSURE THAT ENOUGH COPIES OF ALL MATERIALS ARE AVAILABLE.

- INSURE THAT ALL NECESSARY PRETEST INSTRUCTIONS (i.e., TIME LIMITS, ETC.) ARE IDENTIFIED AND USED FOR EACH TRIAL.

- TRAIN THE EVALUATORS IN TESTING (IF NECESSARY).

- PROVIDE GUIDANCE FOR THE EVALUATOR ON ANSWERING STUDENT'S QUESTIONS.

- PROVIDE ANY OTHER MATERIAL NECESSARY FOR THE TRIAL, i.e., ANSWER SHEETS, NOTE PADS, AND REFERENCE DOCUMENTS.

- INSURE THAT EACH PARTICIPANT BELONGS TO THE TARGET AUDIENCE.

- PROVIDE PARTICIPANT INTERVIEW FORMATS. (USE A FORM SIMILAR TO THE USER QUESTIONNAIRE IN SECTION 4.6 OF CHAPTER 4.)

Because the individual trial is feedback to the developmental process, the writer or designer of the kit must participate. The designer will then know what revisions, based on problems identified in the trials are needed.

Immediately prior to the individual trials, transport all test materials and equipment to the test location. Be sure you are familiar with all of the test materials and equipment. Once at the test site, set up and check the materials and equipment and conduct the individual trials.

Feedback from the individual trials will tell you what to do next. First, if the trials are completely successful, i.e., no instructional errors are noted, the trainees encountered no procedural problems, and the trainees passed the posttest, you may proceed to the large group trial. Second, if you identify problems within the lesson itself, or with the way the lesson is intended to be used, you must revise or modify the lesson. Then, proceed to the large group trial if the lesson can be easily corrected. Finally, if you identify problems which require major revisions, you may want to repeat the individual trials, or conduct a small group trial, after revisions are made.

INDIVIDUAL TRIAL OPTIONS

- PROCEED TO LARGE GROUP TRIALS

- MODIFY OR REVISE LESSON AND THEN PROCEED TO LARGE GROUP TRIAL

- REVISE LESSON AND REPEAT INDIVIDUAL TRIAL OR CONDUCT A SMALL GROUP TRIAL

Bibliography for 5.1.2.

TRADOC PAMPHLET 350-30. ISD Phase III. Fort Monroe, Virginia: U. S. Army Training and Doctrine Command, August 1975. (Pp. 298-303 discuss the procedures to follow in order to conduct individual trials.)

5.1.3 Small Group Trial Phase

Small group trials can be conducted after individual trials. If no problems were identified in the final individual trials, you may elect to skip these and move immediately into the evaluation testing phase.

Preparations for conducting the small group trial are identical to those involved in the individual trials. But, you will need more materials to handle more trainees.

The difference between the individual trial and the small group trial is solely the number of trainees using the lesson and the equipment. Otherwise, the small group trial is identical to the individual trial with similar purposes and options based on results.

A SMALL GROUP TRIAL IS

- CONDUCTED BY SIMULTANEOUSLY TRYING INSTRUCTIONAL MATERIALS ON 6 TO 10 STUDENTS WHO ARE REPRESENTATIVE OF THE TARGET POPULATION BUT, NOT INCLUDED IN THE INDIVIDUAL TRIAL.

- CONDUCTED FOR THE PURPOSE OF IDENTIFYING THOSE AREAS WITHIN THE LESSON SUBJECT KIT WHICH REQUIRE REVISION TO INSURE INSTRUCTIONAL EFFECTIVENESS.

SMALL GROUP TRIAL OPTIONS

- PROCEED TO LARGE GROUP TRIAL

- MODIFY OR REVISE LESSON AND THEN PROCEED TO LARGE GROUP

- REVISE LESSON AND RETURN TO INDIVIDUAL TRIALS

RETURNING THE KIT

IF EITHER THE INDIVIDUAL OR THE SMALL GROUP TRIAL DISCLOSES PROBLEM AREAS WITHIN THE TEC LESSON KIT, RETURN IT TO THE WRITER/DESIGNER FOR REVISION. BE SURE TO INCLUDE APPROPRIATE PROBLEM IDENTIFYING COMMENTS LIKE: "THE ILLUSTRATIONS IN FRAMES 5, 7, and 9 OF LESSON "A" ARE "BLURRED" OR "THE ANSWER KEY IS WRONG " OR "THE LESSON DOES NOT TEACH OBJECTIVE NUMBER _____ ."

Bibliography for 5.1.3

TRADOC PAMPHLET 350-30. ISD Phase III. Fort Monroe, Virginia: U. S.
     Army Training and Doctrine Command, August 1975. (Pp. 304-312
     provide information for determining revision requirement and
     making revisions.)

<u>5.1.4 Effectiveness Testing Phase</u>

The effectiveness testing
phase is the most important aspect
of development of training effective
TEC lessons. In this phase you
can determine whether the lesson
you have developed (or monitored)
is truly effective with the soldiers
for whom it was designed. You
will know after conducting this
phase that the lesson <u>will</u> train
most of the target soldiers in
the required skills to a given
level of proficiency. You and the
School will have set the level
of proficiency (by defining the
standards for GOs on each train-
ing objective) and the percentage
of soldiers who must achieve those
standards based on the importance
of the training objective. When
the lesson has been demonstrated
to be effective to the levels you
have set, you can be confident
that the lesson will also be
effective in the field. Of course,
the demonstration of training
effectiveness may require revision
and retesting until the criterion
level of effectiveness is achieved.

That is the iterative nature of
lesson development and evaluation.

Because this phase is so
important to effective lesson
development, it must be conducted
extremely carefully and in
accordance with these guidelines.
Poor development and evalu-
ation costs time and money and
results in ineffective training.
Proper development and evaluation
results in better trained, more
effective and more satisfied
soldiers. Remember, your job
is to ensure proper conduct
of the effectiveness testing
and lesson evaluation.

The overall effective-
ness of the testing sequence is
shown below. The steps are
addressed in the following
paragraphs and in Section 5.2.

THE EVALUATION TESTING SEQUENCE

```
        ┌──────────────────────────────────┐
        │ DETERMINE THE TESTING LOCATION   │
        └──────────────────────────────────┘
                        │
                        ▼
        ┌──────────────────────────────────┐
        │ SELECT TARGET AUDIENCE SAMPLE    │
        └──────────────────────────────────┘
                        │
                        ▼
            ┌──────────────────────┐
            │ ADMINISTER PRETEST   │
            └──────────────────────┘
                        │
                        ▼
            ┌──────────────────────┐
            │ ADMINISTER THE LESSON│
            └──────────────────────┘
                        │
                        ▼
            ┌──────────────────────┐
            │ ADMINISTER POSTTEST  │
            └──────────────────────┘
                        │
                        ▼
            ┌──────────────────────┐
            │ SCORE & VALIDATE     │
            │ BY OBJECTIVE         │
            └──────────────────────┘
                        │
                        ▼
```

┌──────────────┐
│ NO   │
│ RESERVATIONS │
└──────────────┘
        ▲
        │   YES   ◇ VALID? ◇   NO   ┌──────────┐
        ▼   │ REJECT   │
┌──────────────┐   └──────────┘
│ WITH   │
│ RESERVATIONS │
└──────────────┘

5-20
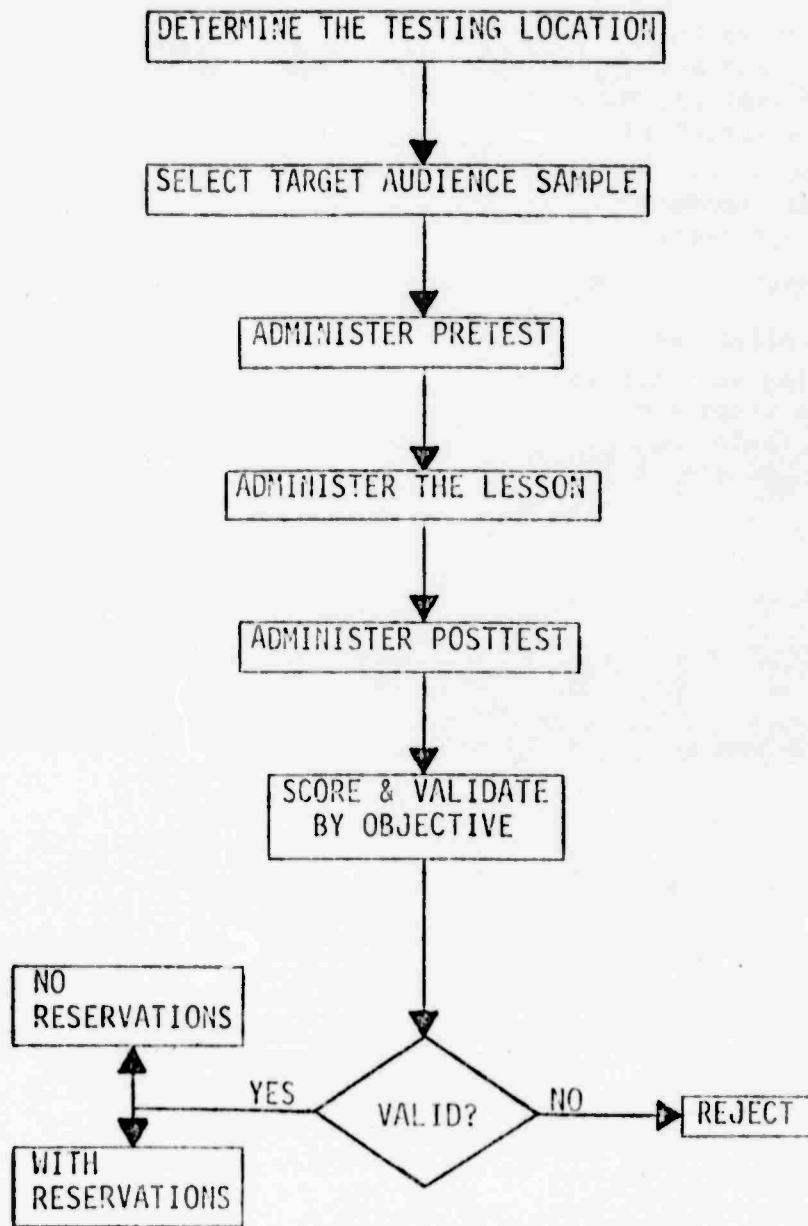
The Testing Location.

The testing location is very
important to the proper
validation of a TEC lesson.
If the lesson requires use
of the LAW (Light Antitank
Weapon) and no LAW can be
made available at the chosen
location, that location is
no good. You need to con-
sider other, just as obvi-
ous, points.

CONSIDERATIONS FOR SELECTING TEC LESSON VALIDATION LOCATIONS:

- IS THE TASK BEING TRAINED PERFORMED THERE?

- IS THERE A LARGE ENOUGH TARGET AUDIENCE AVAILABLE FROM WHICH
  TO DRAW A SAMPLE?

- CAN THE NECESSARY COOPERATION BE SMOOTHLY ATTAINED?

- CAN THE NECESSARY FACILITIES BE MADE AVAILABLE?

- CAN THE NECESSARY ADMINISTRATIVE SUPPORT BE MADE AVAILABLE?

Having selected the location,
you can now proceed with the
evaluation.

Determining the Target Audience and Drawing A Sample.

The target audience for a given
lesson consists of the entire
population of soldiers who
must be trained. This means
every person in the MOS for
which the lesson was designed.
Or, it means every soldier who
can benefit from the lesson
through: 1) upgrading his/
her MOS; 2) retraining into
the MOS; 3) reviewing, prac-
ticing, and/or maintaining
MOS skills.

IDENTIFYING THE TARGET AUDIENCE

- IDENTIFY THE MOS FOR WHICH THIS TEC
  LESSON IS BEING PREPARED.

- IDENTIFY THE NUMBERS OF PEOPLE
  ASSIGNED THE MOS.

- IDENTIFY SKILLS THAT CAN BE TRAINED,
  REVIEWED, PRACTICED, OR MAINTAINED
  BY USING THE LESSON.

- IDENTIFY REQUISITE SKILLS.

• THE SUB-POPULATION SAMPLE MUST NOT DIFFER FROM THE TARGET POPULATION IN ANY WAY THAT WOULD AFFECT THE LESSON EVALUATION.

Drawing a representative sample from the target population is the next step. The sample must be representative of the population - not confined to some peculiar subgroup, such as highly trained personnel, or especially selected personnel - so that the results of the lesson testing can be expected to apply to the whole population. The usual scientific way to assure a representative sample is to draw randomly from the total population until a sufficiently large group is obtained to provide a reliable sample of the population. This is impractical for TEC lesson testing because the population is widely dispersed and individuals in the target MOS cannot be called back from U. S. Army-Europe (USAREUR), Alaska, or Korea, just to participate in lesson evaluation. Therefore, we settle for a sample drawn from the sub-population available at the testing installation - assuming there are no special qualifiers about the troops at this installation, such as special selection GT score, that makes this group non-representative of the population. If the sub-population is suspected of being very different from the population - better or worse - in ways that would affect the TEC lesson evaluation, then find another sub-population.

After identifying the sub population to be sampled, there are several ways to draw the actual sample of 30 or more

in lesson training. The most scientific would be to throw the names (or SSANs) into a hat or barrel, stir them up thoroughly, and draw one name/SSAN at a time until you had enough individuals for the sample. This would assure a truly random sample. However, this is also somewhat impractical; and a simpler method can be used which provides nearly as good results.

The simple method is to obtain an ordered list of SSANs of the available individuals across units and to sample systematically from the list. That is, if there are 500 troops in the desired MOS at an installation and you want a sample of 35 troops for testing, get the list of the SSANs of the 500 troops, and select every 14th* one on the list for your sample. This will give you 35 names out of the 500. Since some of these people will not be available for testing, it is wise to take every 15th name as an alternate for the preceding name on the list and use that individual only when the original pick is not available. Although this process is not

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*The number 14 comes from dividing the sub-population size (500) by the desired sample size (35). The number counted to the person to be picked thus varies with the sub-population size and sample size.

strictly a random one, it will yield an essentially random sample of the sub-population because there are normally no systematic biases in either SSAN assignments or list aggregation. It can be shown that SSAN assignment is essentially a random process, and that systematically sampling from SSANs provides essentially a random sample.

In general, the rules, given below must be observed.

RULES FOR SAMPLE SELECTION

- STUDENTS FOR THE EVALUATION TEST MUST BE RANDOMLY SELECTED FROM THE STUDENTS AVAILABLE. (THIS RULE IS MODIFIED BY THE FOLLOWING RULES.)

- STUDENTS USED FOR THE EVALUATION SAMPLE MUST NOT HAVE BEEN USED FOR DEVELOPMENTAL TESTING COVERING THE OBJECTIVES BEING EXAMINED.

- STUDENTS MUST HAVE MASTERED PREREQUISITES AND HAVE PASSED POSTTESTS OF PREREQUISITE TEC LESSONS, ADMINISTERED BY THE SERVICE SCHOOL, IN ORDER TO BE USED AS SUBJECTS FOR VALIDATION TESTS FOR MATERIALS WHICH ARE DESIGNED TO BUILD UPON PREVIOUS INSTRUCTION.

- STUDENTS WHO PASS THE PRETEST SHALL NOT BE USED AS PART OF THE VALIDATION SAMPLE.

- IF TESTING IS CONDUCTED USING A FIXED SAMPLE SIZE, THAT SAMPLE SHOULD INCLUDE AT LEAST 30 STUDENTS.

In some cases, you may have to make sure the lesson is equally effective for different subgroups in the population. For example, if the lesson is to be used for both male and female soldiers, and if you think there may be different training effectiveness for the two groups, you will have to test it on sufficient numbers of both groups to demonstrate its effectiveness for

both groups. This calls
for about 30 - 35 persons
to be tested in each group
and for stratified sampling
development.

For this type of test-
ing situation, you would
break your 500 troops into
the two subgroups: let's
say it breaks into 350
males and 150 females.
To select your two sam-
ples, each of 35 troops,
you would then take every
10th male on the list for
the male sample; and every
4th female on the list
for the female sample.
Similar sampling might be
necessary by Branch or by
MOS when testing lessons
to be equally effective
across Branches or across
MOSs. Such multiple group
testing would only be
necessary when you or your
School had serious reason
to believe there were real
differences between the
soldiers in the different
Branches or MOSs that could
cause different reactions
to the lessons and thus
different training effec-
tiveness results. This
is not believed to be
the usual case, but you
should be aware of the
possible need for multiple
group testing, and should
consider it in relation
to each TEC lesson you are
developing. Use it when
you have to.

TEC contracts let to date,
two methods for testing TEC
lessons have been specified;
those are the "Fixed Sample"
method and the "Sequential
Testing Sample" method.

```
┌─────────────────────────────────┐
│ TEC LESSON TESTING METHODS      │
│                                 │
│  • FIXED SAMPLE                 │
│                                 │
│  • SEQUENTIAL TESTING SAMPLE    │
│                                 │
└─────────────────────────────────┘
```

Fixed Sample. The
Fixed Sample method requires
you to select the number of
soldiers to be tested in ad-
vance (at least 30). These
soldiers are then given a
pretest, TEC lesson, and a
posttest. The lesson is accept-
ed if for each training objec-
tive (TO) the proportion of
sampled soldiers passing the
posttest for the TO exceeds
a prespecified criterion value.
However, in practice it has
turned out that even if 30
soldiers all view a TEC lesson
at the same time in a group,
they can rarely be tested
simultaneously. Since testing
(or at least test scoring)
occurs sequentially, it is
recommended here that the
Sequential Testing Sample
method be used in all cases.

Sequential Testing Sample.
The Sequential Testing Sample
method requires you to make an
entry in each of a set of
charts (one for each TO) after
scoring each test. Based on
these entries, you then decide
whether to accept the lesson,
reject it or go on to the
next test. The use of the
charts is described in more
detail in Section 5.1.5.
While the number of soldiers
that must be tested cannot be
known in advance using this

5-26

method, experience has
shown that you will
rarely have to test
more than 30 soldiers
before reaching a de-
cision on the lesson.
For very good or very
bad lessons, you will
probably reach a deci-
sion with considerably
less than 30 soldiers.

*Testing Sequence
Errors*. You can minim-
ize the opportunities
for testing sequence
errors by reviewing
the TEC Lesson Evalu-
ation Process in rela-
tion to the questions
below.

MINIMIZE TESTING SEQUENCE ERRORS

- CAN THE VALIDATION SESSIONS BE EXECUTED WITHIN THE FRAMEWORK OF
  EXISTING ARMY REGULATIONS?

- ARE THE IDENTIFIED TESTING MATERIALS READILY AVAILABLE?

- IS THE IDENTIFIED EQUIPMENT READILY AVAILABLE?

- IS THE NEEDED ADMINISTRATIVE SUPPORT READILY AVAILABLE?

- ARE THERE ANY OBVIOUS ERRORS OR PROBLEMS CONTAINED WITHIN THE PLAN?

- IS THE PROPOSED SEQUENCE OF EVENTS CORRECT AND REASONABLE?

Pretest Administration.
Before administering the pre-
test, be sure that the stu-
dents know the purpose of
the test and the lesson
following it. Explain
the TEC Lesson Evaluation
Process, and provide the
trainees information
about the sequence of
events in which they will

5-27

be involved. That is, explain to them what they will be doing during each step of the evaluation process. During the conduct of the test, make sure the testers maintain an impartial attitude.

Pretesting should be easy and routine, if the proper prior attention is given to the administration requirements. Be sure the pretest has been validated (See Section 5.1.1). Also, students passing the pretest cannot continue in the evaluation process. Finally, do not give any feedback to the students who don't pass because they may learn the test and not the lesson objectives.

Lesson Administration. Since your goal is to determine the training effectiveness of a TEC lesson, you must be sure that the test situation duplicates the real learning situation. If the lesson is going to be used in a learning center, try to validate it using a learning center environment. If the lesson is for field or maintenance hanger use, test it in that situation.

When a TEC lesson is ready for evaluation in a large group trial, the lesson will usually be in the sound-slide stage of development, with only one copy being available for use in the evaluation. For this reason, most schools elect to present the lesson to the sampled soldiers in groups of five or more at a time rather than having each soldier view the lesson individually. However,

---

FOR PROPER LESSON ADMINISTRATION

- BE SURE ALL TRAINERS HAVE REVIEWED THE INSTRUCTIONAL MATERIALS TO BE EVALUATED IN DETAIL AND ARE ABLE TO USE THEM APPROPRIATELY.

- BE SURE ALL TRAINERS KNOW THAT THEY MUST KEEP AN IMPARTIAL ATTITUDE DURING THE CONDUCT OF A LESSON AND DO SO.

- INSURE THAT THE TEST ITEMS/ANSWERS ARE KEPT FROM COMPROMISE.

It should be kept in mind that when a lesson is viewed in a group mode, there is little or no self-pacing. For certain tasks (disassembly of a M60 machinegun for example) the lack of self-pacing may decrease the effectiveness of the lesson.

Posttest Administration.

The posttest does not have to differ from the pretest. Therefore, the procedures, materials, equipment, and manpower required for the posttesting effort can be essentially the same as those required to implement the pretest effort.

CONSIDERATIONS FOR POSTTEST ADMINISTRATION

- HAVE POSTTESTING PROCEDURES BEEN CLEARLY IDENTIFIED?

- ARE THE TYPES OF TESTING FACILITIES NEEDED (RIFLE RANGE, CLASSROOM, DRILL FIELD, ETC.) IDENTIFIED AND AVAILABLE?

- ARE THE REQUIRED TESTING MATERIALS (BOOKS, PAPER, FILM, PENCILS, ETC.) IDENTIFIED AND AVAILABLE?

- IS THE NEEDED TESTING EQUIPMENT (HARDWARE, PROPS LIKE LAW OR A RADIO, ETC.) IDENTIFIED? IS IT AVAILABLE?

- IS NEEDED MANPOWER (NUMBER OF TESTERS, AIDES TO GRADE, TRAINERS, ETC.) IDENTIFIED? IS IT AVAILABLE?

After the posttest you should provide full feedback of results to each trainee and question each one about the quality and acceptability of the lesson. Although

bearing on the acceptability
of the lesson in the statistical
sense, these often provide
you with the best information
about where to start in further
revisions to the lesson if it
should be rejected. Even if
the lesson is accepted, the
trainee comments should be
seriously considered and when
faults have been identified
which can be easily or cheaply
corrected, these revisions should
be made. Remember, these soldiers
are the people you're design-
ing the lesson for. Their
opinions are important and can
make your job easier and your
output better. Even effec-
tive lessons won't train if
people don't use them; and if
the soldiers don't like them,
they won't use them. Pay
attention to the consumer!

Bibliography for 5.1.4

TRADOC PAMPHLET 350-30. ISD Phase III. Fort Monroe, Virginia: U. S.
     Army Training and Doctrine Command, August 1975. (Pp. 312-328
     discuss group trial preparation, target evidence determination and
     drawing a sample.)

5.1.5 Validation Decision-
Making Phase

This phase of TEC effec-
tiveness evaluation is critical
and is perhaps the most complex
procedurally. Based on the
recommendation of Section 5.1.4,
above, we present only the process
for making the decision about
lesson validity based on the
sequential sampling decision
technique. This technique pro-
vides high confidence that

will be trained to the
selected criterion with
the least expenditure of man-
power and other resources.
The rules, given below,
will assist you in eval-
uating the effectiveness
of a TEC lesson.

RULES FOR EVALUATION

- INSTRUCTION SHALL BE EVALUATED ON AN OBJECTIVE BY OBJECTIVE BASIS.

- ALL OBJECTIVES SHALL BE ACHIEVED ON A GO - NO GO BASIS.

- EACH OBJECTIVE SHALL HAVE BEEN RATED FOR IMPORTANCE AND CERTIFIED
  ACCEPTABLE BY A MEMBER OF THE SERVICE SCHOOL OR OTHER GOVERNMENTAL
  OFFICIAL.

- DECISION CRITERIA FOR LESSON EFFECTIVENESS WILL VARY WITH THE
  IMPORTANCE OF THE OBJECTIVE.

Scoring by Objective.
All posttests must be scored
in correspondence with the
criteria defined for pass/
fail with respect to each
objective. These criteria
relate to the correct ans-
wers/performance in response
to each criterion-referenced
item related to each train-
ing objective. They must
have been defined before
hand by school personnel
and made into a scoring
key for the posttest.
Each soldier's responses
on the posttest are now
scored with this key.
After individual respons-
es are scored, it must be
determined whether the
soldier has passed or
failed with respect to
each training objective.

The GOs and NO-Gos for
each soldier are the data
you use to determine whether
the lesson is training
effective for each objec-
tive. These scores must
be entered on the appropri-
ate charts in the order
scored to preserve the
validity of the process
(see the Plotting Scores
Section below).

*Selecting Charts for
Each Training Objective.*
The TEC contracts include
five distinct charts (for
the sequential scoring
process) to be used to
evaluate the training
effectiveness of a TEC
lesson with respect to
each objective. The chart
to be used for each objec-
tive is determined by the
importance rating (given
below) assigned to that
objective (that is, there
is a specific chart assoc-
iated with each importance
rating). Remember you are
not responsible for determin-
ing the importance of the
objective. You are respons-
ible for seeing to it that
the objective has been
rated with respect to its
importance.

IMPORTANCE RATING FOR EACH OBJECTIVE IS DETERMINED BY:

- THE CONSEQUENCES OF INADEQUATE PERFORMANCE OF THE OBJECTIVE.

- THE TIME AVAILABLE FOR LEARNING ON THE JOB.

- THE AVAILABILITY OF TECHNICAL ASSISTANCE AND REFERENCES ON THE JOB.

- THE AMOUNT OF INSTRUCTION AVAILABLE CONCERNING THIS OBJECTIVE AND
  AND THE NUMBER OF PLACES WHERE THAT INSTRUCTION IS AVAILABLE.

An example of a
sequential testing
chart is shown below.

SEQUENTIAL TESTING CHART - AN EXAMPLE

HIGH	75%	LESSON NO.	_____
DESIRABLE	65%	KIT TITLE	_____
LOW	55%	OBJECTIVE NO.	_____

α = .05 β = .25

CERTIFICATION _____
(SIGNATURE OF U.S. GOV. REP.)

Number of NO GOs

AREA OF
REJECTION

AREA OF
ACCEPTANCE

Number of Trials
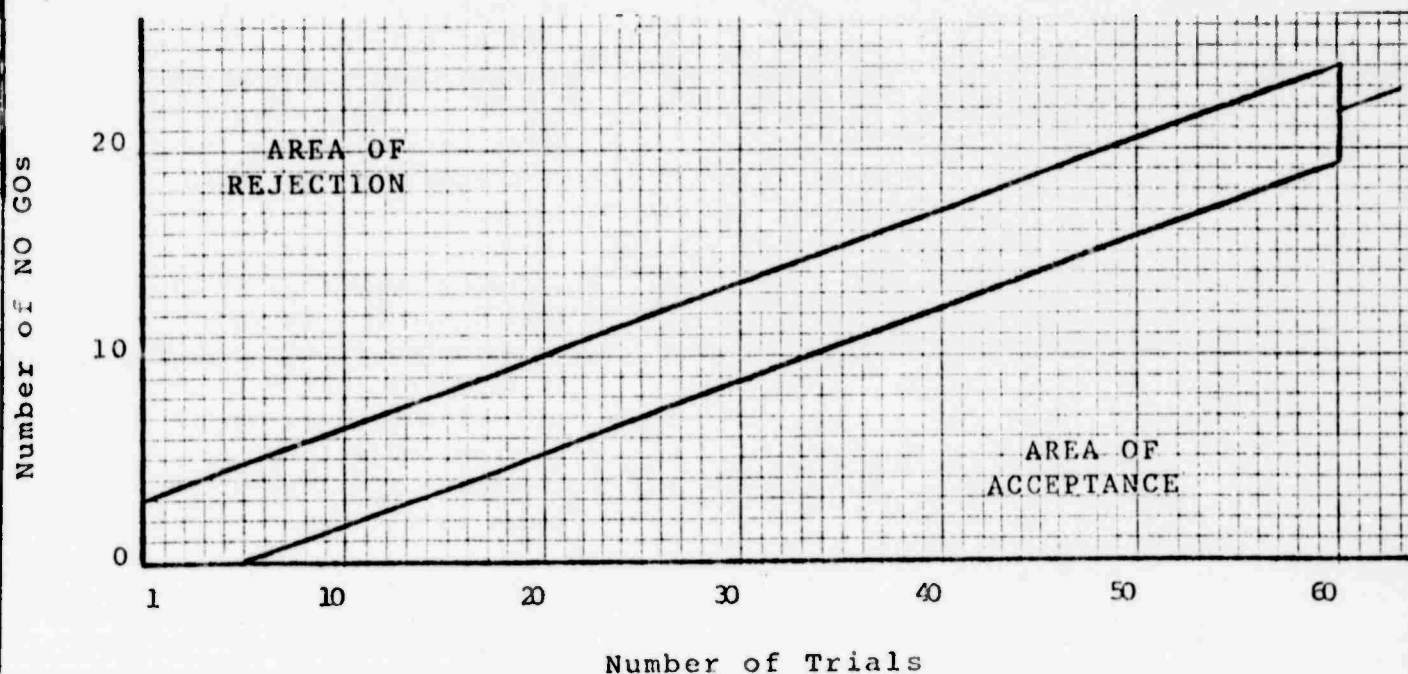
Plotting GO-NO GO Scores.

As illustrated above the sequential testing charts are graphs on which are to be plotted to the GO-NO scores of each soldier with respect to an individual objective. Five numbers are given on each chart. These are a "High", "Desirable" and "Low" value for the percent of soldiers receiving a GO on the test for a given training objective, along with two other numbers, "α" and "β". The numbers are interpreted as follows:

- α is the probability that an objective would be rejected if the percent of soldiers in the target population receiving GO for that objective, after reviewing the lesson, were equal to the "High" value.

- β is the probability that an objective would be accepted if the percent of soldiers in the target population receiving GO for that objective, after reviewing the lesson, were equal to the "Low" value.

The horizontal axis counts the number of trials (soldiers taking the test) and the vertical axis counts the cumulative number of NO GOs. The graph is simply a mechanical way to determine whether the lesson should be accepted or rejected, based on the results of the tests, for that objective. The parallel lines on the chart mark the regions for acceptance or rejection.

The area on each group between the diagonal lines is the "continue testing area." Above the lines is the "reject" area. The area below the lines is the "accept" area.


To mark the charts, place an X on the graph for each trial. Regardless of how you have presented the lesson to the soldiers - one-by-one, in a large group, or in a series of small groups - data must be recorded in the order tested and one-at-a-time. If soldiers are tested individually, plot the data immediately after each test. This is the optimum procedure and will maximize the benefits of the sequential testing and scoring method. If soldiers are tested in small groups, score and record all data collected after each group and before you test the next group - you may not have to do any more testing at all.

Each successive trial is plotted, horizontally along the chart. NO GOs are plotted to the right and up one box, GOs are plotted just to the right. For example:
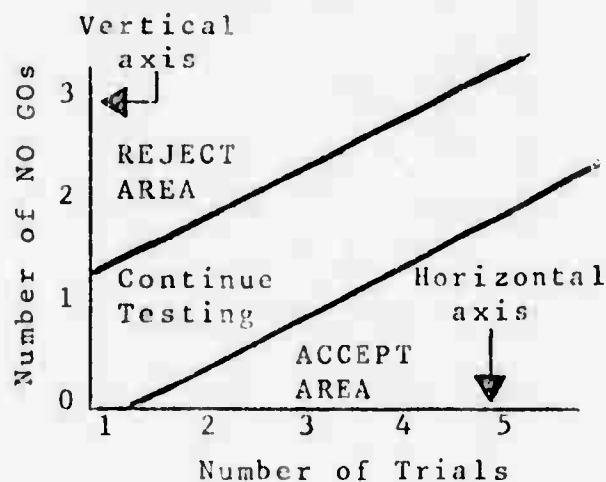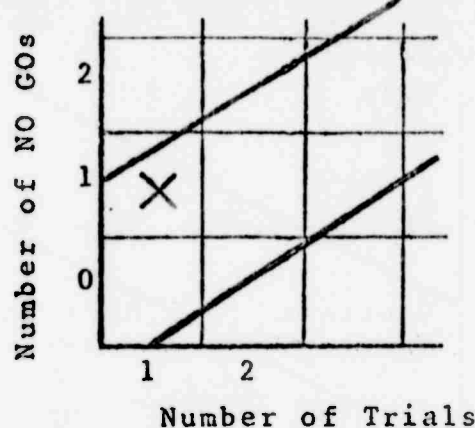
If the first trial
is a NO GO, place an X
in the 1 column for
Number of Trials beside
the 1 row for Number of
NO GOs.
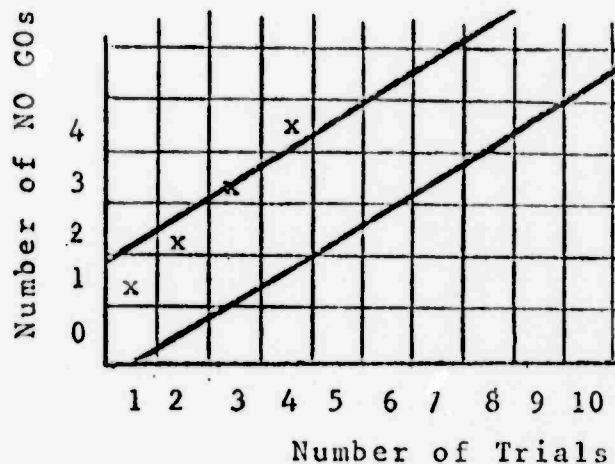
If all the trials
are NO GOs, the chart
would look like this
and the 4th trial is in
the reject area and test-
ing can stop (providing
that a decision has been
reached on all other
training objectives).
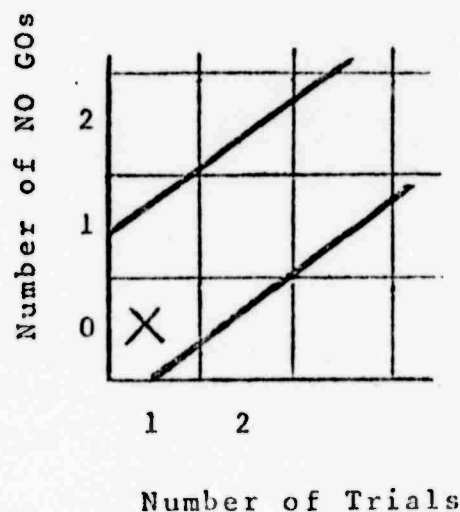
If the first trial
is a GO, place an X in the
1 column for Number of
Trials and beside the 0
row for Number of NO GOs.

5-36

Continue to place the X's horizontally for each GO and diagonally for each NO GO.

If all the trials are GOs, the chart would look like this and the 3rd trial is in the accept area and testing can stop (providing a decision has been reached on all other training objectives.)
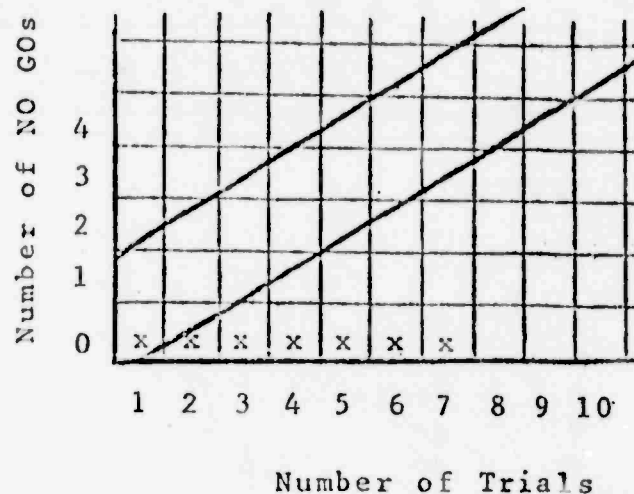
Number of Trials

Sometimes the maximum number of trials will be reached without a decision. In that case, count the squares up to the reject area and down to the accept area. Whichever is closer should be chosen.

Number of Trials

WHEN A MAXIMUM NUMBER IS REACHED (AN EXAMPLE)

STOP LINE

CENTER LINE
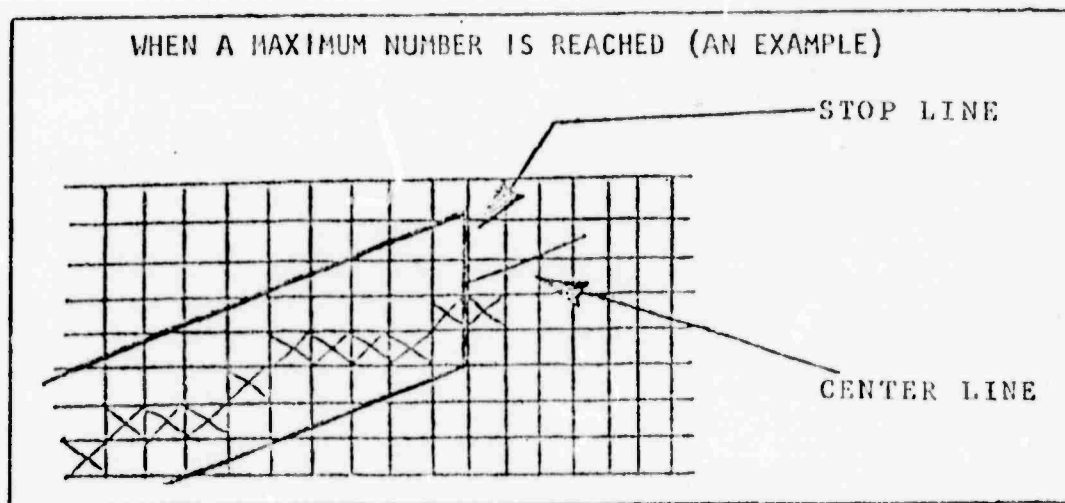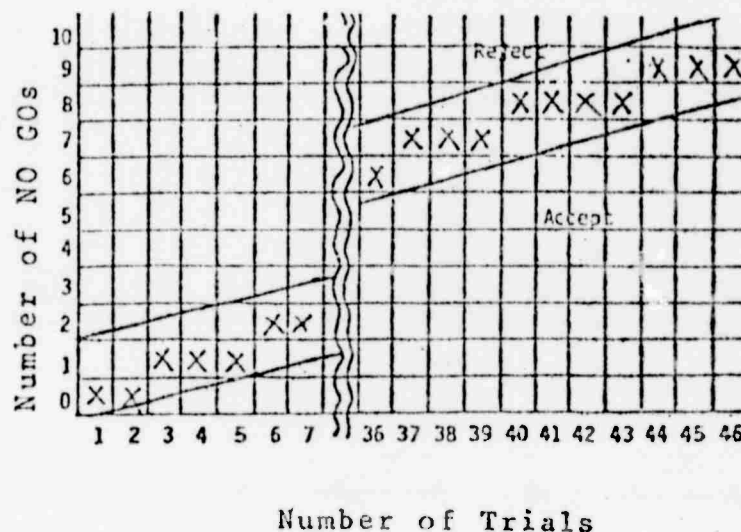
GRAPHING THE DATA (AN EXAMPLE)

Test Data   Graph

Student:

A	go
B	go
C	no-go
D	go
E	go
F	go
G	no-go
H	no-go
I	go
J	go
K	go
L	go
M	go
N	go
O	go
P	go
Q	go
R	go
S	go
T	go
U	go

Number of NO GOs

4
3
2
1
0

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21

Number of Trials
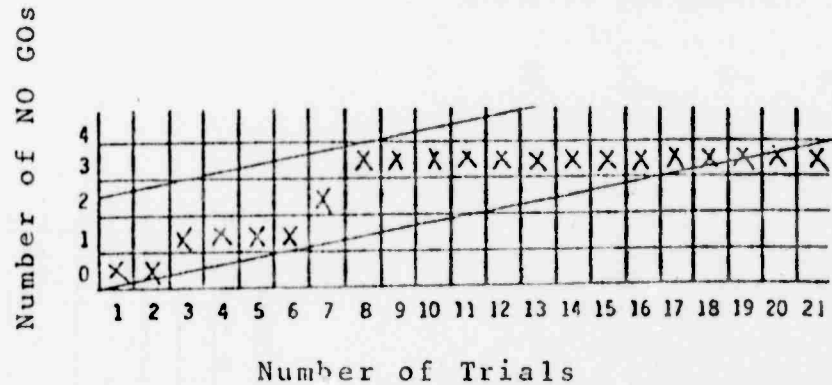
Rather than a test-
ing situation that results
in all GOs or NO GOs, the
more usual result would
be a mixture of GOs and
NO GOs. In this example,
it takes 21 trials to
reach the accept area.
Remember, there will be
a graph like the one above

for each objective
in the lesson. Test-
ing must continue
until a decision has
been reached on all
training objectives.

   *Acceptance/Re-
jection of TEC Lesson
by Objective.* The
procedure described
above must be carried
out for each train-
ing objective. When
this has been accomp-
lished, you can
determine directly
from your charts
which training ob-
jectives have been
successfully ac-
complished by an
acceptable number
of soldiers and
which objectives
have not. At this
point there is no
decision to be made
about the training
effectiveness of
the lesson with
respect to each
objective: this
has been shown by
the data - the
lesson either
teaches well or
it does not for
each objective.
The decision now
is with respect to
the total lesson:
Is it effective
enough to be sent
forward for final
development? Is
it effective enough
to be worth revising

where it is weak? Or,
is it so poor that it
should be scrapped and
started over?

If the lesson has
satisfactorily met the
criteria on all train-
ing objectives (and if
trainee comments have
not indicated any serious
quality or acceptance
problems) the lesson should
obviously be passed on to
the final stages of develop-
ment, production and dis-
tribution. If the lesson
has achieved the criteria
with respect to most of
the objectives, it prob-
ably should be worth
revision and retesting to
produce a training effec-
tive lesson. It appears
that only lessons which
totally fail to train on
any of the major objec-
tives should be scrapped.

Any lesson which
fails to validate with
respect to any training
objective must be revised.
Depending on the extent of
failure, the revision may
require going back to the
early (e.g., Individual
trials) stages of effec-
tiveness evaluation pro-
cedure. But, whatever the
extent of revision that is
required and accomplished
after this stage, the les-
son must be reevaluated
through the training effec-
tiveness testing phase -
using another sample of the
appropriate target population.
That means that when revisions
are completed, you must start
all over with Sections 5.1.4

and 5.1.5. The process
must be performed fully
and accurately to assure
that the soldiers in the
field get the "certified
training effective" lesson
that we have promised
them.

Bibliography for 5.1.5

TRADOC PAMPHLET 350-30. ISD Phase III. Fort Monroe, Virginia: U. S.
Army Training and Doctrine Command, August, 1975. (Pp. 317-327
discuss the sequential testing procedure.)

TRADOC PAMPHLET 350-31. (Draft) Preparing extension training. Fort
Monroe, Virginia: U. S. Army Training and Doctrine Command, February
1976. (Pp. 60-68 provide an example of sequential testing.)

Consult Recent TEC Requests for Proposals (RFPs) for any specific guidance
that may be provided for large group validation procedures.

IF THE LESSON IS UNDER CONTRACT, THE
CONTRACTOR WILL:

- IDENTIFY PROCEDURES AND NEEDS FOR
  ADMINISTERING THE PRETEST.

- IDENTIFY PROCEDURES AND NEEDS FOR
  ADMINISTERING THE TEC LESSON.

- IDENTIFY PROCEDURES AND NEEDS FOR
  ADMINISTERING THE POSTTEST.

- IDENTIFY A METHOD FOR MEANINGFULLY
  REPORTING TRAINEE COMMENTS.

- IDENTIFY EFFECTIVENESS DECISION
  MAKING CRITERIA ACCORDING TO
  CONTRACT SPECIFICATIONS.

The previous sections (5.1.1-5.1.5) described what you had to do in order to produce effective lessons. Because lessons can be produced both in-house and under contract you can apply these guidelines to in-house lesson development and use them as a basis for monitoring what the contractor does.

5.2.1   The TEC Manager's Role

When a TEC lesson is being developed under contract, you have two primary roles. First, you are an evaluator. In your role as an evaluator, you are responsible for assuring the government that the contractor has properly conducted an evaluation effort for the newly developed TEC lesson. You are also responsible for certifying the results of the effort. That is, you insure the government that validation results presented by the contractor are the ones that actually occured.

Your second role is that of a facilitator. Here, you assume the responsibility of assisting

the contractor in accom-
plishing his task by
helping him secure neces-
sary military cooperation
in terms of personnel
(administrative support),
testing facilities, soldiers
from the target audience,
equipment, and other items
requisite to the implemen-
tation and conduct of his
evaluation effort.

Ask the contractor
for a time schedule that
reflects where and when he
will be conducting each
phase of his evaluation
effort. When you receive
the schedule, compare the
events planned into the
effort with those in the
TEC contract under which
he is operating. Remember,
a school representative
must be present for all
trials and lesson evalu-
ation sessions.

5.2.2 Minimizing Error

There are two pri-
mary opportunities for
error. First, errors can
occur on the part of the
contractor as a result of
a misunderstanding of the
contract specifications.
Second, errors can occur
on your part as a result
of misunderstanding the
contractor's responsi-
bility for providing
testing materials and
not being aware of the
Government's responsibility
for providing military equip-
ment needed to conduct the
evaluation effort. In

general, errors will be
minimized when the guidance,
given below, is followed.

MINIMIZING ERROR

- IN ORDER TO INFER THAT THE TRAINING MATERIALS ARE EFFECTIVE
  UNDER THE INTENDED CONDITIONS OF USE, THE STUDENT'S EXPOSURE
  TO THE MATERIALS DURING THE ADMINISTRATION OF THE LESSON
  SHALL MATCH THE INTENDED CONDTIONS FOR USE OF THE MATERIALS.

- THE CONTRACTOR SHALL PROVIDE THE FOLLOWING, PRIOR TO COMMENCEMENT
  OF EACH VALIDATION TEST:

  - A LIST OF EQUIPMENT, e.g., 35 MM PROJECTORS, TAPE CASSETTE
    PLAYERS AND ANY MILITARY EQUIPMENT FOR PERFORMANCE TESTING
    REQUIRED. EQUIPMENT WILL BE PROVIDED BY THE GOVERNMENT.

  - A LIST OF MATERIALS PROVIDED BY THE CONTRACTOR, e.g., STORY-
    BOARDS AND/OR 35 MM SLIDES, SCRIPT AND SCRATCH TAPES (AV KIT)
    VISUAL DUMMY (PT KIT) AND SCRATCH TAPE (AO KIT).

When the contractor is ready to implement the evaluation effort, he must notify you. (Refer to the TEC contract for details.) Once properly notified, the Government will supply all of the military equipment, subjects, and material requisite to conducting the evaluation effort. The contractor, however, is responsible for supplying certain materials. Errors here could nullify the trials.

MATERIALS TO BE PROVIDED BY THE CONTRACTOR

(AS REQUIRED)

- SUFFICIENT COPIES OF PRE- AND POSTTESTS AND ANSWER KEYS.

- NECESSARY FORMS FOR RECORDING PERTINENT INFORMATION CONCERNING TRIAL, e.g., STUDENT RESPONSES, PRE- AND POSTTEST RESULTS.

- INSTRUCTIONS TO THE STUDENT, e.g., TIME LIMITS, IF ANY, ACCURACY OR SPEED.

- GUIDANCE FOR THE EVALUATOR ON ANSWERING STUDENT'S QUESTIONS.

- ANY OTHER MATERIAL NECESSARY FOR THE TRIAL, e.g., ANSWER SHEETS, NOTE PADS, AND REFERENCE DOCUMENTS.

Remember, a Government representative must certify each test result. Remember, also, that the contractor must provide personnel to administer the test.

CHAPTER 6

DISTRIBUTION OF TEC LESSONS

CONTENTS

```
DISTRIBUTION OF TEC LESSONS

● PREPARATION AND SHIPMENT OF

   - LAIs

   - SISs

   - HISTORICAL PACKAGE

● TEC LESSON ANNUAL REVIEW

● SAFETY VIOLATION PROCEDURES

● SAFEGUARDING CLASSIFIED
  INFORMATION
```

The first sections (6.2 - 6.4) of this chapter cover the final stages of TEC lesson development and the role the TEC manager must play to insure that the TEC lessons enter into the distribution process in good shape. That is, the TEC manager must see to it that the Lesson Administrative Instructions (LAIs) and the Student Instruction Sheets (SISs) are prepared and shipped, the historical package is put together and shipped, and any adjunctive material (Army FMs or TMs) required of a TEC lesson are properly requested from the AG Centers.

The last sections of this chapter provide intital guidance for conducting the TEC Annual Review, procedures for a safety violation noted in a TEC lesson, and safeguarding classified information.

Concurrent with the development of each TEC lesson you will develop the accompanying LAI and SIS. The LAI provides detailed information on the TEC lesson while the SIS is a brief, concise outline to assist students in the use of the lesson. TEC Training Managers use this information to make decisions on the need for the lesson in their training programs, the use of group or individual modes, and so forth. Included in the LAI is the pretest. This pretest is the same as, or equivalent to, the criterion post-test.

6.1.1 Writing the LAI

LAIs have a standard format. Users familiar with the LAIs can quickly extract the desired information. They must be written to the target audience just like a TEC kit -- brief, concise, clear. The format given below should be followed.

LAI FORMAT

.

TYPE OF LESSON: Common
Semi-Common   Administrative Instruc-
Branch/MOS   tion TEC Lesson No. _____

_____
(Name of Lesson)

1. <u>Training Objectives</u>: Soldiers completing this lesson should be able to:

---

a. ....Verb + object + (complement)

b. ....Verb + object + (complement)

2. <u>Pretraining Actions</u>:

   a. Prerequisites: Many TEC lessons require that the soldier have certain prior knowledge or skills before taking the lesson. Isolate these prerequisites and define them in terms of other required lessons or tasks that the soldier must be able to perform.

   b. Test: This is the diagnostic pretest to determine whether the soldier needs the lesson. This test is either a PERFORMANCE TEST or a CRITERION-REFERENCED TEST. You can combine the two, if necessary.

              The PERFORMANCE TEST contains all needed instructions and details for a real world performance test.

              The CRITERION-REFERENCED TEST is a written test containing criterion test facts from the lesson itself. This paragraph in the LAI provides the guidelines for the test and the standards for determining whether the soldier needs the lesson.

3. <u>Lesson Materials</u>: This paragraph describes the components making up the TEC lesson (audio-visual kits, audio tapes only, skill practice exercises, etc.).

4. <u>Equipment and/or Materials Required</u>: This paragraph precisely describes the items a soldier must have in his possession to adequately take the lesson. Everything must be specified (weapon, pencil and paper, etc.). Also, you specify here how lesson materials can be reordered or resupplied.

5. <u>Length</u>: This paragraph indicates the average length of time the lesson takes in both group and individual modes. The exact or average time for the stimulus presentation is given first.

a. Stimulus Time: _____ minutes

b. _____ minutes -- Individual

c. _____ minutes -- Group

6. Additional Study References: List specific study references related to the lesson objectives. Give the page and/or paragraph numbers in the FMs and TMs.

7. Skill Practices: This paragraph provides trainers with guidance on skill practice exercises necessary to develop proficiency in the tasks learned from the TEC lesson. You may refer the trainer to other training material or provide instructions in an inclosure.

8. Recommendations to the Instructor: This paragraph goes beyond the general information already provided. It gives trainers specific suggestions on how to get maximum efficiency from the TEC lesson. These recommendations should be essential to the development of a sound training program.

The approach in TEC IV is to use one-liners as often as possible. This approach is quick, direct, and to the point. For example:

● Recommendations to the Instructor: This lesson is self-contained and needs no special consideration when used in the individual mode except for gathering the equipment and/or materials required. A maximum of 10 soldiers is recommended for group mode. Place pretest in a document protector and use a grease pencil to conserve paper.

● Recommendations to the Instructor:
a. Distribute the lesson
b. Make sure the soldier has all required materials and equipment
c. Use no more than 10 students for group study
d. Keep the pretest in a document protector
e. Use grease pencil to conserve paper.

TYPE OF LESSON: Common Subject
Applicable to all soldiers in the
Combat Arms MOS's

Administrative Instructions
TEC Lesson # 9(1-071-0084-F

THE M60 MACHINEGUN:
FIRING AND ZEROING

1. **Training Objectives:** Soldiers completing this lesson should be able to:

   a. Identify the correct position and grip for firing the M60 on the bipod and tripod.

   b. Calculate deflection correction.

   c. List the weapon's three rates of fire and when the barrel should be changed for each.

2. **Pre-Training Actions:**

   a. Prerequisites: The following must be taken as a prerequisite to this lesson:
   Lesson # 941-071-0081-F, The M60 Machinegun Functioning
   Lesson # 941-071-0081-F, The M60 Machinegun Pre-Fire Procedures
   It is recommended, however, that the soldier view this lesson by following the series on the M60 machinegun in numerical order.

   b. Testing: Administer the Pre-Test to determine the individual soldier's ability to accomplish the training tasks.

3. **Lesson Materials.** This lesson consists of one filmstrip cartridge and one audio cassette.

4. **Equipment and/or Materials Provided:** To complete this lesson the soldier must have pencil and paper. Initial issue of the pre-test for each lesson is distributed with the lesson. The pre-test should be placed in document protectors and students required to use grease pencil to conserve paper. Additional copies of the pre-test must be locally reproduced.

5. **Length:** Individual application: 40 minutes
   Group application: 55 minutes

6. Additional Study References: TM 9-1005-224-10, FM 23-67.
   Note: These are the manuals available to the soldier on training and written use of the M60 machinegun. These manuals were being reviewed at the time this lesson was produced. This lesson contains all the latest information on the M60 machinegun, and this information will be included in the revised manuals.

7. **Skill Practice:** The material covered in this lesson should be put into practice on the first available training day involving a live fire exercise at a designated range or field training exercises using blank ammunition. During inclement weather there are a pair of exercises that should be conducted in a classroom environment. First have each soldier practice position and grip on the bipod and/or tripod modes of the M60. Next have the soldier calculate deflection and range sizing. The instructor need only draw a target and rounds striking away from the target on a blackboard. The instructor then gives the range from the gun to the target, and from there, the soldier calculates his deflection correction. The soldier then makes the appropriate correction on his weapon.

8. **Recommendations to the Instructor:** This lesson is self-contained when used in the individual mode, except for gathering the equipment and/or materials required. A minimum of 10 soldiers is recommended for the group mode. Review the TEC lesson and appropriate references prior to giving a class.

In order to obtain the maximum benefit from this lesson, as indicated in para 2a of these instructions.

Take the pre-test and put them in document protectors to conserve paper.

TEC Lesson # 941-071-0084-F

THE M60 MACHINEGUN: FIRING AND ZEROING

pre-test to Lesson #941-071-0084-F, "The M60 Machine-
and Zeroing". It tests every objective that this
cover. The purpose of this test is to see how much
know about firing and zeroing the M60 machinegun.
at least 11 of the 11 questions correct to pass this
you answer less than 11 questions correctly, or if you
the test items identified by an asterisk (*), you
this lesson. Read each question carefully. Write your
a separate piece of paper. DO NOT WRITE ON THIS TEST.

Which of the three targets shown in the p___
the tree, or C-the road junction, is at t___
zeroing an M60 machinegun?

PRE-TEST/ANSWER KEY

Administrative Instructions
TEC Lesson # 941-071-0084-F

THE M60 MACHINEGUN:
FIRING AND ZEROING

This is the Answer Key to the Pre-Test for Lesson # 941-071-0084-F,
The M60 Machinegun, Firing and Zeroing. This test covers every
objective covered in this lesson. The purpose of this test is
to see how much the soldier already knows about firing and zeroing
the M60 machinegun. Each soldier must correctly answer at least
11 out of 11 total test items to pass this test. If he gets less
than 11 items correct or if he missed any item identified by an
asterisk (*), he should take this lesson.

1. d. (Down and to the rear with both hands.)

2. d. (Down with both hands.)

3. A. (500 meters)

4. Right 2 clicks.

5. The Windage Knob.

6. a. Fire accurately without sights
   b. Move rapidly.
   c. Keep the fire low.
   d. Not slow cadence.
   e. Strike and close.

7. a. (above) 18 ___
   b. right ___ 4 clicks.
   c. right ___ only clicks.

Administrative Instructions
TEC 041-061-6101-F

TYPE OF LESSON: Field Artillery

TUBE ARTILLERY: TESTS OF THE GUNNER'S QUADRANT

6101 - Part I

(Student reads paragraphs 1, 2a, 4, & 6)

1. **Training Objective:** Soldiers completing this lesson will be able to:

   a. Set quadrants.

   b. Use the gunner's quadrant for high-angle fire.

   c. Perform the micrometer test.

2. **Preliminary Actions:**

   a. **PREREQUISITES:** None

   b. **PRETEST:** To determine the skill level of the soldier, you may use the attached performance checklist to administer a hands-on pretest. If the soldier has difficulty with the pretest, direct him to take the lesson. See the directions at the beginning of the checklist for a complete discussion of the various uses of the performance and personnel for administration. See paragraph 8 for a full discussion of the various uses of the performance checklist.

3. **Lesson Materials:** One training cartridge and one extra candle.

4. **Equipment and/or Materials Required:** Pencil and paper.

5. **Length:**

	Standard	Individual	Group
	15 min	50 min	60 min

6. **Study Reference:** None.

7. **Skill Practice:** See paragraph 8.

8. **Recommendations to the Instructor:** The attached performance checklist may be used as best suits the needs of the individual soldier and/or the instructor and help the trainer three ways:

   a. Pretests - To determine the training level of the soldier and the skills or needs

   b. Post-test - To determine if he learned the skills or needs

   c. Skill practice - To take the student through the skills

---

PERFORMANCE CHECKLIST

TUBE ARTILLERY: Tests of Gunner's Quadrant, Part I

TEC 041-061-6101-F

Equipment/Materials Needed: Gunner's Quadrant (M1 or M1A1), Howitzer/Elevation Quadrant, Pencil, Paper

Personnel Needed: Evaluator/Instructor

ITEM	MICROMETER TEST	Evaluation	
	Instructor announces: Perform the micrometer test.	Go	No Go
	Actions of soldier: Performs the following tasks in sequence.		
1.			
2.	Sets arm at ten.		
3.	Sets micrometer at zero.		
4.	Mounts the gunner's quadrant on the elevation quadrant (LOF arrow toward muzzle)		
5.	Centers bubble by elevating or depressing tube.		
6.	Sets arm at zero.		
7.	Sets micrometer at ten.		
8.	Mounts as in step 3.		
	Checks bubble. Centered = OK.		
	Not centered = Report.		

Incl 1
PERFORMANCE CHECKLIST

The SIS is simple. Take the
LAI and transfer the information
required for the SIS according
to the format given below.

SIS FORMAT

STUDENT INSTRUCTION SHEET

Lesson No. _____

_____
(Lesson Title)

AUDIENCE:

- Applicable to what group of soldiers.

TRAINING OBJECTIVES:

- Soldiers completing this lesson should be
  able to:

  a.   .... Verb + object + (complement)

  b.   .... Verb + object + (complement)

MATERIALS REQUIRED:

- This is a list of materials needed to
  complete the lesson.

TIME:

- Overall time needed to take lesson (includes
  both stimulus and response times).

GENERAL INSTRUCTIONS:

- If you have never taken a(n) _____
  (medium of lesson) TEC lesson before, ask
  for assistance.

- Work through the lesson as many times as
  necessary to master all skills taught.

PREREQUISITE:

- TEC lessons, if any, that are prerequisites
  to this lesson should be listed here.

EXAMPLE OF AN SIS

STUDENT INSTRUCTION SHEET

LESSON NO. 530-113-5611-A

AUDIENCE:

* Applicable to Switchboard Operator.

TRAINING OBJECTIVES:

* Place line-to-calling party calls.
* Place emergency calls to busy numbers.

MATERIALS REQUIRED:

* Switchboard, BB-88/P (Operational).
* Pencil and Paper.
* Telephone Switchboard Call Simulator
* Field Telephone Set
* Qualified Operator.

TIME:

* 25-35 minutes

REFERENCES:

* TM 11-2134, Para 38-39
* ACP 134(A), Para 384, 576-577

GENERAL INSTRUCTIONS:

* Work through the lesson until you feel you have acquired the skills and knowledge taught, then arrange for a qualified operator to assist you in the skill practice exercise portion of the lesson.
* FOLLOW INSTRUCTIONS — DON'T TAKE SHORTCUTS.

PREREQUISITE:

* LESSON NO. 530-113-5910-A

Add information to SIS that will cross-reference the LAI. For example, under General Instructions you might add:

* If you think you can perform the training objectives, ask your supervisor for the pretest in the Lesson Administrative Instructions.

After the completion of the LAI and SIS, you must insure that:

- The SIS is sent to the development contractor.

- The LAI is reproduced by the school.

- Tobyhanna is sent advance notice of shipment (see 6.3.3).

TEC Managers are responsible
for preparing and shipping histor-
ical files for each TEC lesson.
This section contains the pro-
cedures for this responsibility.

6.2.1 Itemizing Historical Data and Materials

Historical data for each
TEC lesson must be collected
and shipped to the Training
Materiel Support Detachment
Depot at Tobyhanna. The
list of items that must be
included in the historical
file are given below.

HISTORICAL DATA

1. NARRATION SCRIPT.

2. SHOOTING SCRIPT.

3. STORYBOARDS.

4. COPY OF 35 MM SLIDES (MASTER).

5. COPY OF LAI WITH PRETEST/POSTTEST AND ANSWER KEYS.

6. TYPED COPY OF SIS.

7. COPY OF ADJUNCTIVE MATERIALS (IF REQUIRED).

8. VALIDATION COPY (COMPLETE).

9. CORRECTED COORDINATION AND CONTRACT SUMMARY SHEET TO REFLECT ACCURATELY WHAT THE FINAL PRODUCT CONTAINED.

10. COPY OF APPROVED TREATMENT AND ANY CHANGES.

11. COST DATA (DEVELOPMENT) XEROX OF PAID DD FORM 250.

12. WRITTEN APPROVALS/DISAPPROVALS RELATING TO TREATMENTS (LDA's), SCRIPTS, STORYBOARDS, BOARD ART, 35MM SLIDES, 8MM PRINTS, AUDIO TAPES, AND OTHER CORRESPONDENCE PERTAINING TO GUIDANCE ISSUED PERTINENT TO LESSON DEVELOPMENT.

13. MILESTONE SCHEDULE OF LESSON DEVELOPMENT.

14. ANY OTHER HISTORICAL DATA NOT LISTED BUT WHICH SHOULD BE INCLUDED TO ACCURATELY CASE THE HISTORY OF THE LESSON IN DETAIL.

15. VISUAL DUMMIES FOR PRINTED TEXT LESSONS, WORKBOOKS, ETC.

16. DOCUMENTATION TO INCLUDE LEGAL CLEARANCES, PHOTOGRAPHIC CLEARANCES, COPYRIGHTS, AND NON-STANDARD MUSIC CLEARANCES.

The reproduction contractor is responsible for shipping the Board Art. Board Art will include the following items:

- Board Art.

- Shooting Script.

- Original Narration Script with Latest Changes Annotated.

- Original Motion Sequences (if applicable).

- Work Print of Motion Sequences (if applicable).

The school must provide the camera-ready copy for printed text lessons, workbooks, LAIs, and adjunctive material.

6.2.2 Itemized Packing List and Its Distribution (Historical Data)

When shipping historical files to Tobyhanna, schools are responsible for preparing five (5) copies of the itemized packing list (6.3.1). Disposition will be as shown below.

ITEMIZED PACKING LIST - TEC HISTORICAL DATA

1. DISPOSITION WILL BE AS FOLLOWS:

    A. ONE COPY PLACED INSIDE OF SHIPPING CONTAINER WITH MATERIALS.

    B. ONE COPY PLACED IN AN ENVELOPE AND AFFIXED TO THE OUTISDE
       OF THE SHIPPING CONTAINER.

    C. ONE COPY SENT TO COMMANDER, U. S. ARMY TRAINING SUPPORT
       CENTER, ATTN: ATTSC-TP-PD, FORT EUSTIS, VIRGINIA 23604.

    D. ONE COPY SENT TO COMMANDER, TOBYHANNA ARMY DEPOT, ATTN:
       ATTSC-TP-TM (TEC), TOBYHANNA PENNSYLVANIA 18466.

    E. ONE COPY RETAINED BY SCHOOL AS A FILE COPY.

2. ALL PACKAGES BEING SENT TO TOBYHANNA ARMY DEPOT WILL BE
   ADDRESSED AS FOLLOWS:

                          COMMANDER
                          TOBYHANNA ARMY DEPOT
                          TRAINING MATERIEL SUPPORT DETACHMENT
                          ATTN: ATTSC-TP-TM (TEC)
                          WAREHOUSE 3 BAY 3
                          TOBYHANNA, PENNSYLVANIA 18466

6-14

TEC lessons and adjunctive material go to Tobyhanna for distribution. As the TEC program has grown, the amount of material periodically received by Tobyhanna has grown enormously. Consequently, Tobyhanna has a problem of coordinating and predicting the arrival times of lessons, adjunctive material, LAIs, and historical files. The TEC manager can assist Tobyhanna by giving them advanced notice of anything soon to be shipped. By using the Shipment and Utilization Report for advanced notice, the Tobyhanna people can better prepare for efficient storage and distribution. This translates into getting the TEC lessons to the field <u>faster</u>. Until Tobyhanna has the LAIs and adjunctive material to accompany the TEC lesson (if applicable), NOTHING GOES OUT!

6.3.1 Overview of TEC Lesson Distribution

The process of preparing for distribution involves the following:

- The school sends the SIS to the development contractor.

- The school reproduces the LAIs and notifies Tobyhanna well in advance.

- The school sends a request to AG Publication Center for adjunctive materials which AG subsequently ships to Tobyhanna.

- The school sends a letter of distribution instructions to Tobyhanna for the adjunctive materials.

- Tobyhanna receives an approved copy of the answer print from the project engineer (Orlando, Fla.).

- DCAS sends an advance copy of DD 250 from the contractor site.

- If text is printed in-house, TEC manager should see that Tobyhanna gets advanced notice of shipment.

The flow of TEC lesson materials among and between the schools, ATSC/TPD, the Development Contractor, the Reproduction Contractor, and Tobyhanna is given below. As you can see, the flow of TEC materials coming from all the schools and the Reproduction contractors for all TEC lessons can really become a mess without timely communications.
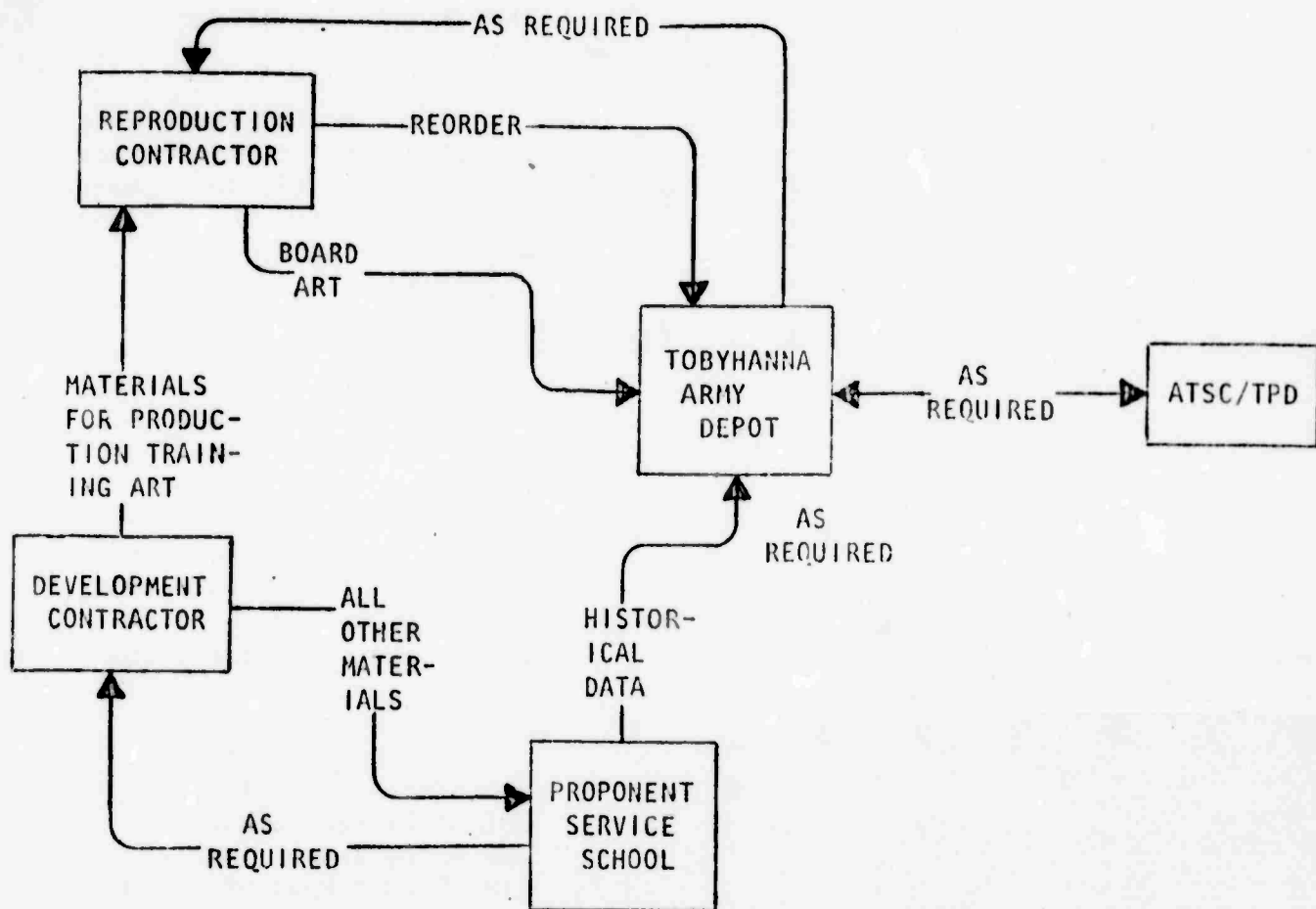
6.3.2 Palletizing Procedures

Each pallet should con-
tain printed matter relating
to one TEC lesson only. When
materials from several les-
sons come into Tobyhanna
on one pallet, there is a
great pos¡bility that a
mix-up wil occur. It
requires the sorting out

of the material and often
the repackaging of materi-
als.

Heavy or bulky contain-
ers should be metal strapped
or bound securely in a man-
ner that ensures the cartons
will arrive at Tobyhanna
undamaged.

Packaging Instructions.
Separately pack any adjunc-
tive materials, including
workbooks, LAIs, lesson
texts, errata sheets, change
sheets, DA Forms, and Tech-
nical manuals. These items
should be sorted out and
packed <u>one</u> <u>subject</u> <u>per</u> <u>box</u>
<u>only</u>.

In partially filled
containers use a light-
weight filler to use up
the empty space. AT NO
TIME SHOULD PART OR ALL OF
ANOTHER LESSON BE USED TO
FILL THE EMPTY SPACE.

Marking and Identify-
ing the Containers. Each
cardboard container should
be clearly marked with one
inch high lettering to
indicate:

- Lesson Number

- Quantity

- Type printed matter
  (LAI, printed text,
  workbook)

Each carton should be
numbered to indicate the
amount of cartons in the
shipment. For example:
Box 1 of ___; Box 2 of ___;
Box 3 of ___.

Place an itemized packing list of the entire shipment in Box No. 1. The list should include the following information:

- Complete or partial shipment.

- Release number of the lesson.

- Subject title.

- Type printed matter (LAIs, TMs, Workbooks, etc.).

- Quantity of contents.

- Total carton number in the shipment.

6.3.3 Advance Notice to Tobyhanna

As we pointed out in 6.3.1, Tobyhanna sorely needs advanced notice of any impending shipment. Tobyhanna personnel suggest you always use the Shipment and Utilization Report form to provide them with advanced notice of anything. You can use the explanation section if it is something not covered in the form itself.

SHIPMENT AND UTILIZATION REPORT

ADJUNCTIVE MATERIALS AND LESSON TEXTS

TO.
DEPARTMENT OF THE ARMY
Training Support Center
Training Material Support Detachment
ATTN: ATTSC-TP-TM
Tobyhanna, Pa. 18466

FROM.

THE FOLLOWING TEC ADJUNCTIVE MATERIALS AND/OR PROGRAMED TEXT'S HAVE BEEN PROCESSED THROUGH THIS SCHOOL FOR ARRIVAL YOUR ACTIVITY ON OR BEFORE _____

LESSON TEXT	QTY SHIPPED	SUPPORTS LESSON No.	BOX	THIS SECTION TO BE COMPLETED BY THE TEC DISTRIBUTION ACTIVITY, TOBYHANNA ARMY DEPOT.
				THIS MATERIAL WAS RECEIVED AT TOBYHANNA ON
LAI				(DATE)
				☐ SHIPMENT RECEIVED IN GOOD CONDITION
				☐ SHIPMENT RECEIVED IN UNSATISFACTORY CONDITION.
				EXPLAIN _____
JOB AID				
WORKBOOK				
FORMS/TM S				
OTHER				
				(SIGNATURE) TEC MANAGER TMSD TOBYHANNA ARMY DEPOT
(DATE)	SIGNATURE PROJECT OFFICER			(DATE)

If Army publications
(FMs, TMs) are required for
a TEC lesson, then you req-
uisition them from AG Pub-
lication Centers at St. Louis
and Baltimore. The AG Publi-
cation Centers will ship
directly to Tobyhanna pro-
vided you follow the procedures
given below:

Procedures

- Identify adjunctive ma-
  terials required for a
  lesson.

- Prepare for the appropri-
  ate AG Publication Center
  the following:

  a. DA Form 17 in ac-
     cordance with the
     following guidance:

     (1) Block 1 Type of
         Requisition:
         Regular

     (2) Block 2 Justi-
         fication for
         Special Requi-
         sition:

NOTE: "Account Number" and
"Ship To" are different as
approved by Letter, ATTNG-
TA-TEC, U.S. Army Training
Support Center, 16 June 1976,
subject: Request for Excep-
tion for Policy at AG Publi-
cation Centers with 1st Inc,
DAAG-PAD, DA TAGCEN, 7 July
1976.

(3) Block 6 Ship To:
Commander
Training Materiel
Support Detachment
Warehouse 3, Bay 3
510-091-6456-F (TEC
Lesson No. material
for)
Tobyhanna Army Depot
Tobyhanna, PA 18466

(4) Block 7 Requirements:
One requisition item
per request (i.e., if
lesson requires a TM
and a blank form,
two separate DA Form
17's are required).

(5) Block 8 Requester:
Place AV phone num-
ber of a person to
be contacted if any
questions should
arise on requested
order.

b. Send a cover letter along
with its inclosures with
each DA Form 17.

● Send a letter to:
Commander
Training Support Center
ATTN: ATTSC-TP-TM
Training Materiel Support
Detachment
Tobyhanna, PA 18466

and a courtesy copy to:
Commander
U.S. Army Training Support
Center
ATTN: ATTSC-TP-PD
Fort Eustis, VA 23604

providing the following infor-
mation:

a. Copies of all separate
DA Form 17 actions.

b. Instructions on how
to distribute ad-

ATTNG-TA-TEC   16 JUN 1976

SUBJECT: Request for Exception to Policy at AG Publication Centers

HQDA (DA-AG-PAD/Mr. Kane)
Forrestal Building, Room CA033
WASH DC 20314

1. Reference, FONECON between Mr. Kane, DA-AG-PAD, and CPT Brown,
ATTNG-TA-TEC, 4 June 1976.

2. US Army Service Schools periodically have requirements for large
quantities of publications or pamphlets for use as adjunctive materials
with Training Extension Course (TEC) Lessons.

3. These materials have been requisitioned through AG Publication
Centers at St Louis and Baltimore with instructions to ship directly
to Tobyhanna Army Depot (TOAD) where all TEC lesson materials are con-
solidated and distributed to the field. Unfortunately, some materials
are being shipped back to the ordering schools. This results in dupli-
cation of effort, additional cost to the government, and delays in
receipt of materials at TOAD.

4. Successful shipments have been handled by bypassing the computer
and requesting special handling in a separate memorandum attached to
the regular requisition. However, AR 310-10 precludes honoring "ship
to" requests on a recurring basis without an exception to policy.

5. Because of the recurring need for service schools to order materials
on a "ship to" basis, and the desire to eliminate duplication of effort,
request an exception to AR 310-10 for schools ordering adjunctive
materials for TEC lessons.

6. Upon approval of the exception to policy, the Training Support
Center (Provisional) will notify all schools of the change and the
procedures to be followed. This request has been coordinated with
Mr. Ray Kane, DA Publications.

7. The US Army Training Support Center (Provisional), Training Programs
Directorate, TEC Division, point of contact is Captain Carlton Brown,
AUTOVON 927-4121/4124.

FOR THE COMMANDER:

E. T. VILLACOMEZ
CPT, AGC
Administrative Officer

junctive materials per
lesson (i.e., four blank
DA form $\overline{2404}$'s per TEC
Lesson No. 510-091-6456-F).

c. Provide address and phone
number of a person to be
contacted at school so as
to verify receipt of your
order at Tobyhanna.

• Set up a suspense file allow-
ing seven weeks to be notified
of the receipt of adjunctive
materials at Tobyhanna. If
not notified, call:

1st -- Tobyhanna, AV
247-9437 (TEC)

2nd -- Appropriate AG
Publication Center

Baltimore, MD --
AV 584-2045

St. Louis, MO --
AV 698-7861

SCHOOL HEADING

SUBJECT: Special Handling of DA Form 17, Request for Training
Extension Course (TEC) Program

1. Reference, Letter, ATTN-TA-TEC, US Army Training Support Center,
16 June 1976, subject: Request for Exception to Policy at AG
Publication Centers with 1st Indorsement, DAAG-PAD, DA TAGCEN, same
subject, Inclosure 1.

2. As approved, request special handling on the attached DA Form 17,
Requisition for Publications and Blank Forms, Inclosure 2.

2 Incl   SIGNATURE BLOCK
as   of Requester

6.5 TEC LESSON ANNUAL REVIEW PROCEDURES

The responsibility for annual review and revisions of TEC lessons belongs to the school that has been designated the proponent agency for that particular lesson series. As TEC manager, you are responsible for insuring that the school:

- conducts a formal annual review of each lesson that is at least one-year old after approval for mass production.

- maintains records of the reviews and sub-mits the results to ATSC/TPD.

6.5.1 Determining Sig-nificant Errors

During the annual review of a TEC lesson, particular care and at-tention should be paid to changes or modifi-cations in:

- training tasks

- performance standards

- training objectives

- job requirements

- equipment

- doctrine.

6.5.2 Recommendations and Actions for Changes or No-Changes

Based on the lesson review, the school will make a formal recommendation to ATSC/TPD. If no changes are required, the report will have the no-change format. If the review establishes that changes are needed, the school will make a formal recommendation to that effect along with the extent and method of revising the lesson.

A change requiring more than an errata sheet is a serious problem in terms of time and money. A decision must be reached as to the value of making the necessary corrections or deleting the lesson altogether.

SAMPLE FORMAT

ERRATA SHEET

DATE

TEC NO Number(s):

Instructions: (Must include type of revision, how it was constructed to be tested, i.e., LAT, Pre/Post test, and who would post/record change.)

Specific Comments:

6.6 PROCEDURES FOR A SAFETY VIOLATION

Once you are notified of a possible safety violation in a TEC lesson that could result in injury to a soldier or damage to Government property, you must do three things:

- Immediately notify ATSC/TPD that a possible safety violation exists.

- Conduct an evaluation to determine whether a safety violation indeed exists.

- Make a recommendation to ATSC/TPD.

ATSC/TPD will take the necessary actions to stop distribution of the specific TEC lesson when a violation has been identified.

6.7 SAFEGUARDING DEFENSE INFORMATION

Classified TEC lessons are now being developed. If you are going to develop Classified TEC, you should:

- Contact the TEC Classification Officer.

- Obtain a copy of DOD Directives and Security Regulations (DOD 500, 1-2).

- Review the TEC document on classified lessons.

APPENDIX A

GLOSSARY

GLOSSARY

Advanced Individual Training (AIT).   Training given enlisted personnel
                                      subsequent to completion of basic
                                      training, so as to render them
                                      qualified for the award of a mili-
                                      tary occupational specialty.

Annual Review.   Review of each TEC lesson on the
                                      anniversary of its approval for
                                      mass reproduction. Review is
                                      conducted to assure lesson currency.

Answer Print.   .   Audiovisual preproduction sample.
                                      It consists of Super 8 color-corrected
                                      film, loaded in a cartridge, and a
                                      pulsed audio cassette.

Army Training and Evaluation   A listing of training and evaluation
  Program (ARTEP).   outlines that contain minimum col-
                                      lective training objectives and gui-
                                      dance pertaining to specific missions.
                                      ARTEPs can serve as the basis
                                      for evaluation by which the level
                                      of training proficiency of a particu-
                                      lar unit can be determined and future
                                      training requirements can be diagnosed.

Army Training Extension Course   One of the three Army-wide training
  Program (ATECP).   programs managed by the Training Pro-
                                      grams Directorate, US Army Training
                                      Support Center. The Chief, ATECP is
                                      responsible for centrally managing the
                                      planning, evaluation, development,
                                      production, distribution, and field
                                      implementation of all Training
                                      Extension Course lesson materials and
                                      supporting hardware.

Army Training Support Center   Coordinates the preparation of con-
  Training Programs Directorate   tractual requirements and helps
  Project Officer (ATSC-TPD PO).   solve problems as they occur at all
                                      schools, after a contract has been
                                      awarded.

Audio Only Kit.   An audio tape cassette which "talks"
                                      a student through a series of actions.
                                      Generally, used in conjunction with a
                                      hands on orientation, i.e., maintenance
                                      procedures.

Audiovisual Kit.

A TEC kit consisting of a Super 8mm continuous loop film cartridge with an accompanying audio tape cassette, pulsed to drive the film. Both film and tape are compatible to the Beseler Cue/See.

Basic Combat Training (BCT).

Training in basic military subjects and fundamentals of basic infantry combat given to newly inducted and enlisted Active Army and Reserve components personnel without prior military service.

Basis of Issue Plan (BOI, BOIP).

Plan for the distribution of TEC lessons developed by ATSC and coordinated with the proponent service school or plan for the distribution of TEC hardware developed by ATSC.

Beseler Cue/See.

Audiovisual device used for viewing TEC audiovisual lessons.

Commandant's Contract.

Contract between Commander, TRADOC, and the School Commander with each service school portraying resources provided to each school and products expected from each school on a FY basis.

Composite Task List.

A listing of all tasks taught by all current or programmed TEC lesosns. Maintained by USATSC-TPD.

Conditions.

Occurs in terminal learning objectives; describes what is presented to the student in order to accomplish the specified action, that is, it describes the important aspects of the performance environment.

Contract.

Formal document between the contractor and the government that specifies exactly what and how many TEC lessons will be developed during a particular time period.

GLOSSARY

Contract Developed Lessons.

Lessons designed and developed by a contractor which follow contractual specifications and are evaluated for technical accuracy and instructional and audiovisual quality by ATSC, schools, PM TRADE, and NTEC personnel throughout the development cycle.

Contracting Officer's Technical Representative (COTR).

Individual who is normally located at the site of a development or reproduction contractor to assist ATSC, schools, PM TRADE, and the Contracting Officer in expediting the contractual process.

Contractually Cancelled Lessons/ Kit.

Lesson/kit, that by mutual agreement between proponent and contractor, is cancelled from the delivery schedule. Contractor is paid for work accomplished through the cancellation.

Coordination and Contract Summary Sheet (CCSS).

A CCSS is completed for each subject area submitted for development. The CCSS outlines the scope and purpose of lessons being developed for each subject area, target audience, lesson objectives, acceptable standards of performance and criterion-referenced test items. It accompanies all GFM or references provided contractor for development of a lesson series.

Criteria.

States how well something is to be performed.

Criterion-Referenced Instruction (CRI).

Instruction which is designed to teach only those performances which are specified as critical to the successful accomplishment of a defined task.

Criterion-Referenced Test (CRT).

Measures what an invividual can do or knows, compared to what he must be able to do or must know in order to successfully perform a task. Here an individual's performance is compared to external criteria or performance standards which are derived from an analysis of what is required to do a paritcular task.

A-4

Criteria-Referenced Test Items (CRTI).

The individual measures of a CRT.

Critical Task.

The lowest level of behavior that describes the performance of a function critical to the job.

Development Phase.

Phase of TEC lesson development process that includes the development of initial instructional materials; conduct of individual, small group and large group tests; and approval of camera-ready kits.

Duty.

One of the major subdividions of work performed by one individual. One or more duties constitute a job.

Effectiveness Testing/Large Group Testing.

Part of development phase which determines whether or not the lesson trains the soldiers for whom it was designed.

Final Draft.

Last version of a lesson before the production of the master material; i.e., camera-ready materials.

Fixed Sample.

In testing the effectiveness of a lesson, a preset number of soldiers are selected in advance. Decisions are based on the outcome of that preset sample.

Flow Diagram.

Used in TEC contracts to visually depict actions/events required of each participant involved in developing TEC lessons. Frequently accompanied by a narrative description, the flow diagram provides specific instructions and precise sequencing for TEC developers.

Front-end Phase.

Phase of TEC lesson development process that uses the job/task analyses to define what and how TEC lesson subject areas should be described.

Government Furnished Material (GFM).

Documents and equipment supplied to a contractor before and during performance under that contract.

GLOSSARY

Graphic Arts Guidance Kit (GAGK).

Kit available from ATSC-TPD that specifies standards for development of visuals in audiovisual and printed text lessons.

Historical Package.

Originals or copies of all correspondence and attendant training materials for a specific TEC lesson from concept to completion. Master historical data for all lessons are maintained at Tobyhanna Army Depot, Pennsylvania.

Individual Trial.

In testing the effectiveness of a lesson, this is the initial tryout of lesson materials on 3 to 5 soldiers representative of the target population.

In-House Development.

Lessons designed and developed within an individual school using school resources or contract services procured by the school from local civilian community, using a local installation procurement contracting office.

Initial Draft.

First complete compilation of a TEC lesson.

Instructional Systems Development (ISD).

A five volume text that presents a fully documented, detailed, systematic approach to instructional development.

Job.

The duties and tasks preformed by a single worker constitute his job. If identical duties and tasks are performed by several individuals, they all hold the same job. The job is the basic unit used in carrying out the personnel actions of selection, training, classification, and assignment.

Job Performance Aid (JPA).

One of the four types of TEC lessons. Consists normally of operating instructions for simple equipment or "how to" instructions to complete a process.

Job/Task Analysis.

The basic method used to obtain a detailed listings of duties, tasks, and elements necessary to perform a clearly defined, specific job or task, involving observations of workers and conversations with those who know the job, in order to describe in detail the work involved, including the classes of behaviors, conditions of performance, and degrees of proficiency required.

Job Training Package.

A totally designed group of training materials in a self-contained, exportable, primarily TEC configuration. The package is designed to train and evaluate all skills associated with a specified job, duty position, skill level or MOS.

Kit. .

A kit is the self-contained instruction material developed, reproduced and packaged for distribution to soldiers in the field. A kit will be in an audio-visual, printed text or audio only format. Closely related kits, those dealing with the same subject ares, will constitute a lesson.

Kit Design Approach (KDA).

Prepared by contractor and contains the description of the kit, how the kit will be developed, outline of size and content, outline of administrative requirements to support the kit, and provisions for design changes.

Large Group Testing.

(SEE Effectiveness Testing).

Lesson.

A lesson is the instructional material within one (1) subject area. A lesson may be composed of one or several closely related kits.

Lesson Administrative Instruction (LAI).

Accompanies each TEC lesson and provides detailed information on the lesson. The LAI includes both a pretest and a posttest.

GLOSSARY

Lesson Content Analysis Report (LCAR).	Contractor developed outline of general approach for constructing instructional material to support a lesson specified by a proponent. Contains an appraisal of the adequacy of GFM.
Master Kit.	Kit containing all the master materials, i.e., camera-ready copies, which are constructed from an approved final draft.
Master Mechanicals.	Final copy of a printed TEC lesson which is camera-ready for printing.
Masters.	Soldiers who are experts at one particular job or task.
Master Tape.	Final recording of an audio only lesson or the audio portion of an audiovisual lesson ready for mass reproduction.
Naval Training Equipment Center Contracting Officer's Technical Representative (NTEC COTR).	Placed with reproduction contractor for quality control and to coordinate between the school and the reproduction contractor.
Naval Training Equipment Center Project Engineer (NTEC PE).	Insures quality control through inspection of products for compliance with the technical standards required by the contract, and is directly responsible to PM TRADE.
Non-Masters.	Soldiers who are new to a job or task and have no expertise in that job or task.
Objectives.	Describes precisely what the personnel undergoing instruction must be able to do at the end of that training. A properly structured training objective contains three elements: (1) Task to be accomplished stated in performance terms using action verbs, (2) Conditions under which the task is to be accomplished, and (3) Standards of acceptable performance.

Performance-oriented Training.   Emphasizes the knowledges and skills
that are needed to perform a task or
job.

Performance Test.   The absolute standard by which the
performance of a skill is measured. It
lists the exact steps a person must
follow in performing the skills being
tested. The tests are prepared in terms
of the specific task to be performed,
conditions under which it will be
performed and the absolute standards
for acceptable performance.

Posttest.   A test administered after the comple-
tion of instruction to assess whether
a student has mastered the objectives
of the course or unit.

Pre-award Phase.   Phase of TEC lesson development process
during which the contract is written.
Also called the Front-end Phase.

Preproduction Sample.   Sample product of a TEC kit submitted
to the proponent school and PM TRADE
for approval prior to the mass reproduction
run. In the audiovisual medium the sam-
ple is an answer print. In audio only
the sample consists of a duplicate of the
master tape in an appropriate tape
cassette. In printed text the sample
consists of proof prints of master
mechanicals.

Pretest.   Administered prior to instruction to
determine how much the student already
knows.

Printed Text Kit.   A printed TEC lesson. Used when this
medium is educationally sounder than
others.

Project Manager for Training   Monitors contract performance, and
Devices, Acquisition   directs and coordinates the develop-
Director (PM TRADE AD).   ment and implementation of remedial
actions when problems occur. Does
not normally interact directly with
the school.

GLOSSARY

Project Manager for Training
  Devices, Contracting Officer's
  Technical Representative
  (PM TRADE COTR).

Monitors and facilitates the orderly
progress of the contract while
residing at the contractor's place
of work. Serves as a direct point of
contact between the school and the
contractor.

Reliability.

The consistency with which a test
measures the amount of student
achievement.

Reproduction Phase.

Phase of TEC lesson development pro-
cess which covers the reproduction
and distribution of approved TEC
lessons.

Response Time.

The time that the student actively
participates in a lesson.

Scratch Tape.

Initial narrative recorded on tape
for review, correction, improvement,
and approval for finished narrative.

Script.

A detailed plan of all that constitutes
an audiovisual or an audio only lesson.

Sequential Testing.

A method of testing which allows the ran-
dom selection of a single sample at a
time, with the pass/fail result of a
criterion test plotted on a control
graph. The graph is constructed to ensure
that acceptance or rejection of instruc-
tional materials is done with a known
probability of error.

Skill Qualification Test (SQT).

A test to improve the combat effective-
ness of Army units by getting soldiers
to do a better job. Measures how well
a soldier can do the tasks of his
assigned job. Measures performance,
not knowledge.

Small Group Trial.

In testing the effectiveness of a
lesson, this is the second tryout (which
is optional) of lesson materials on a
group of 6 to 10 soldiers representative
of the target population.

Soldier's Manual (SM).

Manuals published by proponents which contain all critical tasks for a specific MOS, normally organized by skill level.

Sound/Slide Kit.

35mm slides and a draft narrative tape to represent what the finished audiovisual lesson will be. Used in the review/approval cycle.

Standards.

Occurs in terminal learning objectives; describes the criterion or standard of performance which must be attained.

Stimulus Time.

The time the student spends viewing or listening to the TEC lesson materials.

Student Instruction Sheet (SIS).

Printed instructions accompanying each TEC kit to assist students in use of the kit.

Subject Matter Expert.

A soldier who has professional skill in the performance of some job and who is consulted by an instructional designer during the TEC lesson development process.

Target Audience/Population.

The pool of potential entrants to training for which instructional materials are designed and tried out.

Task Analysis.

(SEE Job/Task Analysis).

Training Extension Course (TEC).

Validated, interactive, performance oriented, exportable training materials developed by contract or in-house and fielded under the sole direction of the US Army Training Support Center (ATSC). TEC materials are multimedia and are designed for individual self-paced or small group study. TEC is designed to assist the field commander in maintaining the individual skills of his soldiers.

Training Extension Course (TEC) Manager.

Individual at each school who is responsible for the development of TEC lessons that cover the subject areas for which the school is responsible.

GLOSSARY

Training Task Analysis.

Takes tasks selected for training and structures them in ways that help the soldier master the perform-ance of those tasks. Often approxi-mates the job/task analysis.

Validation.

Testing instructional materials after course development to ensure that the materials are effective and the stu-dents are mastering the learning objectives.

Visual Dummy.

A stage in the development of printed text lessons that illustrates how the narration and visuals will appear in the Final draft.

APPENDIX B

ACRONYMS

ACRONYMS

AD	Acquisition Director
ARI	Army Research Institute for the Behavioral and Social Sciences
ATSC	Army Training Support Center
ATECP	Army Training Extension Course Program
AV	Audiovisual
AO	Audio Only
ARTEP	Army Training and Evaluation Program
ATB	Army Training Board (previously CATB)
BCT	Basic Combat Training
BER	Budget Execution Review
BMG	Budget Manpower Guidance
CA	Contractor Assisted
CAI	Computer Aided Instruction
CATB	Combat Arms Training Board
CCSS	Coordination and Contract Summary Sheet
CONUS	Continental United States
COTR	Contracting Officer's Technical Representative
CRI	Criterion-Referenced Instruction
CRT	Criterion-Referenced Test
COB	Close of Business
DARCOM	U. S. Army Materiel Development and Readiness Command
DAVIS	Defense Audiovisual Information System

DCAS	Defense Contract Administrative Services
DCSRM	Deputy Chief of Staff Resource Management
DD	Department of Defense (Used on forms, _e.g._, DD 633-4)
DOD	Department of Defense
DOE	Directorate of Evaluation
DTD	Directorate of Training Development
EOE	Element of Expense
EPMS	Enlisted Personnel Management System
FM	Field Manual
FY	Fiscal Year
GAGK	Graphic Arts Guidance Kit
GFM	Government Furnished Materials
IH	In-House
ISD	Instructional Systems Development
JPA	Job Performance Aid
JPM	Job Performance Measure
JTP	Job Training Package
KDA	Kit Design Approach
LADA	Lesson Analysis Design Approach
LAI	Lesson Administrative Instructions
LCA	Lesson Content Analysis

ACRONYMS

MOS	Military Occupational Specialty
N/A	Not Applicable
NCO	Non-Commissioned Officer
NLT	No Later Than
NTEC	Naval Training Equipment Center
OJT	On-Job Training
PE	Project Engineer
PM Trade	Project Manager for Training Devices
PO	Project Officer
POC	Point(s) of Contact
PT	Printed Text
RCS ATTNG-SS	Report Control Symbol for Quarterly TEC Product Requirement
RFP	Request for Proposal(s)
SIS	Student Instruction Sheet
SM	Soldier's Manual
SME	Subject Matter Expert
SQT	Skill Qualification Test
TC	Training Circular
TDI	Training Developments Institute
TDY	Temporary Duty

TEC	Training Extension Course
TM	Technical Manual
TO	Training Objective
TPD	Training Programs Directorate
TRADOC	U.S. Army Training and Doctrine Command
USACATB	U.S. Army Combat Arms Training Board
USATSC-TPD	U.S. Army Training Support Center-Training Programs Directorate